

**Bloomberg
Businessweek**

February 20 — March 5, 2017 | bloomberg.com
SPECIAL DOUBLE ISSUE

ELON MUSK IS REALLY BORING.



**The billionaire's new
Trump-era business plan:
Building tunnels**

FAST
TRACK

DIGITAL
INNOVATION



82% of the Fortune 500®
rely on BMC for digital innovation

 **bmc** digital IT



**“IN
ORDER TO
MONEY
LAUNDER,
YOU
NEED TO
HAVE
DIRTY
MONEY
TO START
WITH.
I ALWAYS
HAD
CLEAN
MONEY”**

p56



1

**“Despite the things that
people read in the headlines,
the world is getting
better. ... Still, it’s not getting
better fast enough”**

p46

**“When a
techie falls,
everyone is
secretly happy”**

p68

**“If you’re alive
today, you’re probably
going to end up having
at least one electronic
attachment”**

p34

| | |
|---|----|
| Opening Remarks Trump is fighting the wrong trade battle with China | 6 |
| Bloomberg View Mongolia must end its mining addiction • The Fed loses a tough cop | 8 |
| Movers ▲ <i>Playboy</i> disrobes again ▼ Disney and YouTube drop PewDiePie | 11 |
| Global Economics | |
| The U.S. is the breadbasket to the world. Trade wars and gutting Nafta could change that | 13 |
| Brazil's crumbling finances trigger a police strike, and violence and looting follow | 14 |
| The loss of the TPP may sting, but Vietnam has other irons in the fire | 15 |
| "Putin's Rasputin" says he patched up relations with Turkey—and can do the same with the U.S. | 15 |
| Companies/Industries | |
| A bum bet on nukes staggers Toshiba | 19 |
| As VW keeps building in Mexico, so does its risk of being slapped with huge border taxes | 20 |
| Music festivals aren't finding much to sing about | 21 |
| Toy chain Detsky Mir's IPO could be just the thing to wake up Russian retail | 23 |
| Politics/Policy | |
| State by state, unions are losing their meal tickets | 25 |
| Why the White House needs a strong lawyer | 26 |
| The Kremlin's media empire masters the art of fake news | 27 |
| Miami-Dade's mayor falls in line with the president on immigration. Must be the money talking | 28 |
| Acting SEC Chairman Michael Piowar is acting as if he's the boss | 29 |
| Technology | |
| Worried about nuclear waste? Send in the drones | 31 |
| Startup Gamalon teaches bots to speed-read | 33 |
| Federal energy auctions go online, and activists feel shut out | 33 |
| Cyborg Nest unleashes the first generation of transhumans to walk the earth | 34 |
| Innovation: A needle-size camera to replace MRIs | 35 |
| Markets/Finance | |
| Your car insurance bill is going up, and yes, texting figures into it | 36 |
| Warren Buffett sours on the folks who are managing your money | 37 |
| A market watchdog with way too much to watch | 38 |
| Focus On/Mobile | |
| 5G will get masses of machines talking to one another | 41 |
| Mirror, mirror, on the wall, tell me if this fits at all | 42 |
| Landscape or portrait? Snapchat has a view on that | 43 |
| Mobile ads are on the rise, and Europe's broadcasters are taking note | 44 |
| Features | |
| Debrief: Melinda Gates She talks with Megan Murphy about the foundation she and Bill run | 46 |
| The Hole Thing With the Boring Company, Elon Musk aims to reinvent tunnels and traffic | 52 |
| Oligarch in the Spotlight Dmitry Firtash's fate may say a lot about Trump's Russia policy | 56 |
| Pullet Surprise Do Agri Stats' vast chicken data carry a whiff of price-fixing? | 62 |
| Killer Techies! Indian media's obsession with coders | 68 |
| Etc. | |
| Cruise lines geek out over Trekkies and other superfans filling up their ships | 75 |
| Rant: Just accept that you're never going to listen to that podcast | 78 |
| Beauty: Skin that says, "Why yes, I do properly hydrate" | 79 |
| Design: Spruce up that dull office furniture with a stylish pillow or throw | 80 |
| Workplace: Your ID badge might soon have a built-in microphone and location sensor | 82 |
| What I Wear to Work: New York lawyer John Mangin embraces his inner dork, down to the \$2.99 knit tie | 83 |
| How Did I Get Here? Joy Howard, chief marketing officer of Sonos, was once in a band called Seely | 84 |

Cover Trail

How the cover gets made

1

"The story is on Elon Musk. He's beginning to invest in building tunnels, which he believes is an important business to be in."

"What will that man think of next? We can Photoshop him inside a hole."



2

"Looks great."

"Now we just need a headline. How about 'Elon Musk's Big Drill'?"

"No."

"'Orifice Complex'?"

"No."

"'Tunnel of Musk'?"

"No."

"'Elon's Big Opening'?"

"You seem unusually invested in this headline."

"As always, I want to make sure we represent the story with clarity and taste."





**FAST
TRACK**

**SECURITY
PROTECTION**

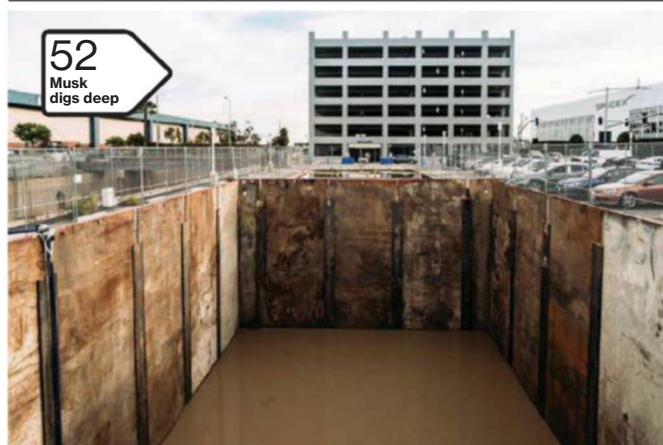


*Security fixes in minutes
not weeks*

 **bmc** digital IT

Index

People/Companies



A

AC Entertainment 21
Aetna (AET) 11
Agri Stats (LLY) 64
Airbus (AIR:FP) 52
Al-Assad, Bashar 15
Allergan (AGN) 11
Allstate (ALL) 36
Alphabet (GOOG) 11
Amazon.com (AMZN) 33, 42, 43, 44

American Aerospace Technologies 41
Anisimov, Vasily 58
Anschutz Entertainment Group 21
Anthem (ANTM) 11
Apple (AAPL) 70
Apple Pay (AAPL) 42
Arko Advice 14
AT&T (T) 41
AutoPacific 20
Awaya 33

B

Babitz, Liviu 34
Bannon, Steve 15, 26, 52
Baratta, Joe 52
Barclays (BCS) 36
Barton F. Graf 43
Basecamp 78
Berchtold, Joe 21
Berkshire Hathaway (BRK/A) 36, 37, 48

Bernhard, James Jr. 19
Beyoncé 21
BGC Partners (BGCP) 19
Big Boi 21
BioStar Ventures 35
Blackstone (BX) 52
BMW (BMW:GR) 20
Boeing (BA) 58
Boston Consulting Group 36, 82
Britain, William 33
Buffett, Warren 37, 48
Bush, George W. 52
Byrd, Frank 37

C

C3 Presents 21
Canal Plus Group (VIV:FP) 44
Cargill 13
Carlyle (CG) 52
Casper 78
CBS (CBS) 76
Chicago Bridge & Iron (CBI) 19
Cigna (CI) 11
Cisco Systems (CSCO) 41
Clayton, Jay 29
Clinton, Hillary 28, 52, 58
CME Group (CME) 38
Comedy Central (VIA) 44

Compare.com 36
Conway, Kellyanne 26
Corzine, Jon 38
Costello, Joe 82
CoverHound 36
Cox, Christopher 29
Cox, Jim 64
Createc 31
Credit Suisse (CS) 11
Crosby, Denise 76
Cuban, Mark 36
Culver, Nada 33
Cyborg Nest 34
Cypher, Healey 42

DEF

Daimler (DAI:GR) 20, 41
Detsky Mir (DSKY:RM) 23
Diehn, Erik 78
Dimon, Jamie 52
Dugin, Alexander 15
Dunzo 70
Earwolf 78
Edison Research 78
EMarketer 44
EnergyNet 33
Enlighted 82
Entertainment Cruise Productions 76
Entner, Roger 41
Erdogan, Recep Tayyip 15
Ericsson (ERIC) 41
Evercore ISI 20
Evtushenkov, Vladimir 23
ExxonMobil (XOM) 52
Facebook (FB) 27, 43, 44
Fallon, Michael 27
Fanning, Thomas 19
Farrell, Perry 21
Farrell, Terry 76
Fendi (MC:FP) 42
Fidelity Capital Group 37
Fillon, François 27
Firtash, Dmitry 58
Fleischman, Edward 29
Fluent 43
Flynn, Michael 11, 26, 58
Flyvbjerg, Bent 52
Ford (F) 20, 28
Forrester (FORR) 42
Forth Engineering 31
Fortress Investment Group (FIG) 11
Fuji Heavy Industries (7270:JP) 20

G

Gamalon Machine Intelligence 33
Gates, Bill 48
Gates, Melinda 46
Gazprom (OGZD:LI) 58
General Motors (GM) 6

Gensler 82
Geometric Intelligence 33
Gimenez, Carlos 28
Gimlet Media 78
Glassman, Cynthia 29
Glauber, Joe 13
Google (GOOG) 33, 52, 70
Gorsuch, Neil 25
Gottfried, Paul 15
Grodénchik, Max 76

H

Haley, Nikki 58
Harbisson, Neil 34
Harris, Calvin 22
Harrison, Evan 21
Hefner, Cooper 11
Hefner, Hugh 11
Heineken (HEIA:NA) 11
Henry, Mary Kay 25
Herrenknecht 52
Hoffman, Jordan 76
Holland America (CCL) 76
Honda (7267:JP) 20
Howard, Joy 84
Huawei Technologies 41
Huka Entertainment 21
Humana (HUM) 11
Humanyze 82



84
Joy
Howard

IJK

IBM (IBM) 52, 70
IHS Markit (INFO) 41
Infosys (INFY) 70
Instagram (FB) 43
Intel (INTC) 41, 70
Ipsos Comcon 23
Jaaga Startup 70
Jha, Mukund 70
Johnson, Dwayne 44
JPMorgan Chase (JPM) 38, 52
Kalanick, Travis 52
Kid Rock 76
Kien, Nguyen Duc 15
Kirin Holdings (2503:JP) 11
Kitty Hawk 52
Kjellberg, Felix 11
Krauss, Lawrence 76

Kravchuk, Leonid 58
Kroger (KR) 64
Kulchin Ross Insurance Services 36

L

Lamar, Kendrick 21
Landor Associates 23
Lazaroff, Michael 76
Liefer, Kirk 13
Live 11
Nation Entertainment (LYV) 21
LiveStyle 21
Louis Vuitton (MC:FP) 42
Lévy, Bernard-Henri 58

M

MacLennan, David 13
Macquarie Group (MQG:AU) 36
Macron, Emmanuel 27
Maggi, Blairo 13
MailChimp 78
Malofeev, Konstantin 15
Manafort, Paul 58
Mangin, John 83
Mapleval Farms 64
Marriott (MAR) 43
Mattel (MAT) 11
Mazda (7261:JP) 20
McGahn, Donald 26
Mediaset (MS:IM) 44
Meirelles, Henrique 14



26
Donald
McGahn

Meister, Stefan 27
Merkel, Angela 27, 44
Metromile 36
Mickiewicz, Ellen 27
Microsoft (MSFT) 19, 33, 48, 70
Midroll Media 78
Minkoff, Uri 42
Mix, Mark 25
Morgan Stanley (MS) 23, 36
Morningstar (MORN) 37
Musk, Elon 52

N

Natixis (KN:FP) 44
NBC (CMCSA) 44
Netflix (NFLX) 41, 44
Neurensic 38
Nielsen (NLSN) 23
Nissan (7201:JP) 20
Nokia (NOK) 41
Nooyi, Indra 52
North Paw 34
NuGeneration 19

O

O'Donnell, Jeffrey Sr. 35
Oak Labs 42
Obama, Barack 26, 38, 52
OccupyEye 82
Ocean, Frank 21
Oracle (ORCL) 70
Orange (ORA:FP) 41
O'Donnell, Jeffrey Jr. 35
O'Reilly, Robert 76

P

Page, Larry 52
Palantir Technologies 38

Patterson, Matt 25
Pekin, Ismail Hakkı 15
PepsiCo (PEP) 11, 43, 52
Pezão, Luiz Fernando 14
Phillips, Randy 21
Phuc, Nguyen Xuan 15
Pilgrim's Pride (PPC) 64
Piscopo, Joe 76
Pitbull 76
Pivotal Research Group 64
Piowar, Michael 29
Playboy Enterprises 11
Pollstar 21
Poroshenko, Petro 58
Procter & Gamble (PG) 11, 23
ProSiebenSat.1 44
Putin, Vladimir 27, 58
Puzder, Andrew 26

QRS

Qualcomm (QCOM) 41
Ralph Lauren (RL) 42
Rebecca Minkoff 42
Recon Analytics 41
Renzi, Matteo 27
Ribas, Moon 34
Rolfe, David 37
Rometty, Ginni 52
Romney, Mitt 52
Rose, Andrew 36
RosUkrEnergo 58
Rotenberg, Arkady 58
Rovio Entertainment 11
RTL Group (RTL:BB) 44
Ruane, Bill 37
Ruane, Cunniff & Goldfarb 37
Sanderson Farms 64
Sanderson, Joe 64
Saunders, Lee 25
Scana (SCG) 19
Schafer, Ed 13
Schwartz, Jason 33
Scott, Drew 76
Scott, Jonathan 76
Sgamma, Kathleen 33
Shatner, William 76
Shiga, Shigenori 19
Sikka, Vishal 70
Sirtis, Marina 76
Sistema (AFKS:RM) 23
Smith, Donnie 64
Smithfield Foods 64
Snap 43, 44
Snyder, Brian 64
SoftBank (9984:JP) 11
SolarCity (TSLA) 52
Solaris Commodities 13
Sonos 84
Southern Co. (SO) 19
SpaceX 52
Spicer, Sean 26
Spotify 78
SpotX 44
Squarespace 78
Starbucks (SBUX) 6

Stein, Kara 29
Still, Swithun 13
Supercell 43
Sweetgreen 21

T

Takei, George 76
Tarullo, Daniel 8
Tata Motors (TTM) 20
Telecom, Media & Finance Associates 41
Telford, Mark 31
Tendências Consultoria 14
Tesla (TSLA) 33, 52
Texas Instruments (TXN) 70
TF1 (TF1:FP) 44
Thai, Tran Viet 15
The Boring Company 52
The Zebra 36
Theme Cruise Finder 76
Tillerson, Rex 52
Toshiba (6502:JP) 19
Travelers (TRV) 36
Trian Fund Management 11
Trice Medical 35
Trump, Donald 6, 8, 11, 13, 15, 20, 23, 25, 26, 28, 29, 38, 52, 58
Trump, Ivanka 26
Tsunakawa, Satoshi 19
Tymoshenko, Yulia 58
Tyson Foods (TSN) 64

UVW

Ube 36
Uber 33, 52
United Technologies (UTX) 28
Vanguard 37, 39
Verizon Wireless (VZ) 41
Vertex Analytics 38
Vigoda, Ben 33
Vivendi (VIV:FP) 44
Volkswagen (VOW:GR) 11, 20
Walt Disney (DIS) 11
Washburn, Richard 35
Wedgewood Partners 37
Widerhorn, David 38
Wilson, Tom 36
Winfrey, Oprah 76
Wipro (WPRO:IN) 70

XYZ

Xi Jinping 6
Yanagisawa, Shane 52
Yanukovich, Viktor 58
Yates, Sally 16
Yellen, Janet 21
Yoel, David 41
Young, Bob 13
YouTube (GOOG) 41, 44
Yushchenko, Viktor 58
Zee.Aero 52
Zeltiq Aesthetics (ZLTQ) 11

How to Contact Bloomberg Businessweek

Editorial 212 617-8120 Ad Sales 212 617-2900
Address 731 Lexington Ave., New York, NY 10022
E-mail bwreader@bloomberg.net Fax 212 617-9065
Subscription Customer Service URL
businessweekmag.com/service
Reprints/Permissions 800 290-5460 x100 or
e-mail businessweekreprints@theygsgroup.com

Letters to the Editor can be sent by e-mail, fax or regular mail. They should include address, phone number(s), and the e-mail address if available. Connections with the subject of the letter should be disclosed, and we reserve the right to edit for sense, style, and space.



**FAST
TRACK**

**IT COST
SAVINGS**



*Save up to 30% on infrastructure costs
and invest in innovative solutions*

 **bmc** digital IT

How to Win a Trade War With China

By Michael Schuman

6

There's a smart way to do it. But Trump seems intent on fighting a kind of enemy that no longer exists

With the ascent of Donald Trump, fears have risen that China and the U.S. might be headed for war. At least for now, any conflict is most likely to be economic. Ever since Richard Nixon's famous visit with Mao Zedong in 1972, the U.S. has striven to treat Beijing as a partner, help its economy develop, and lure the emerging giant into the global order Washington has crafted. Trump, though, believes that policy has allowed China to prosper at America's expense, and that it's high time Washington stood up for U.S. workers, industry, and power. The Chinese "haven't played by the rules, and I know it's time that they're going to start," he said in December.

Much of what Trump says about China is nonsense. But embedded in his rhetoric is an astute and significant point: China is an economic rival to the U.S., and Washington has to start acting like it is. A new approach to defend U.S. economic interests against the ascending Chinese superpower may be necessary, perhaps even critical.

The problem is that Trump is fighting old battles with archaic weaponry and an outdated strategy. In his eyes, China remains primarily a jobs thief, using unfair trade practices, such as currency manipulation, to pilfer U.S. factories and wealth. The blame, he says, falls on America's previous leaders, who chose global over national interests and stood by while China committed "the greatest theft in the history of the world." He's vowed to stand up

to China, reverse the tide, and bring factories and jobs home.

The China that Trump rails against, however, no longer exists. There was a time when Beijing did manipulate its currency to promote its exports, but nowadays its central bank is desperately trying to stop the yuan from weakening. Competition from Chinese manufacturing has also likely cost Americans some jobs—by one estimate, at least 2 million from 1999 to 2011. But now wages for shop-floor workers in China are the highest in developing Asia, and the nation is losing jobs to countries with lower costs. In fact, more and more American manufacturers are in the process of "reshoring," or shifting production back to the U.S. from China.

That's not to say China is no longer a danger to the U.S. Just the opposite. The two countries are still engaged in an economic struggle. It's just over different things. First and foremost, it's a battle for the high-tech industries of tomorrow. No longer content to churn out T-shirts and TVs for U.S. consumers, China wants to develop its own products based on homegrown technology and labeled with Chinese brands. Its goal is to nurture champions to compete with and supplant U.S. companies. This strategy is fully backed by all the resources and powers of the government. Beijing adopted a new industrial policy in 2015, called Made in China 2025, which intends to upgrade manufacturing capabilities for high-tech products including medical devices, electric cars, and robots. Ample government cash and other favors are usually offered to such targeted sectors. A report released by an advisory council in the Obama White House in early January outlined China's efforts to dominate the global semiconductor industry, supported by \$150 billion in public or state-linked funds.

This is a serious risk for America's future. When China started assembling stuff such as iPhones, it may have claimed a few jobs, but it wasn't threatening U.S. economic primacy. If China designs the next groundbreaking product with its own software and chips and under its own brand, then the country can truly undercut America's main economic strengths and challenge its global leadership.

Furthermore, Beijing won't play nice to achieve its goals. Despite perennial promises to continue "opening up," it's tilting the playing field at home toward its own companies, using continued investment restrictions on

foreign companies and other barriers to trade, forced technology transfers, go-slow red tape, and other methods. In a survey by the American Chamber of Commerce in China released in January, 8 of 10 respondents said they feel less welcome than in the past, while more than 60 percent have little or no confidence that China will open markets further over the next three years. Cracking the country open to U.S. business is critical. Companies from General Motors to Starbucks need free and fair access to ever-wealthier Chinese consumers to keep their profits growing.

The big question is: What should the U.S. do about all this? Trump's idea is to shake things up. He's threatened to impose a high tariff on Chinese imports to counteract Beijing's supposed "cheating" and force open its market. Rather than honoring past agreements with Beijing, Trump has indicated he would place them back on the negotiating table.

It's hard to know what Trump's China policy will be. For instance, after angering Beijing by questioning Washington's acceptance of the "One China" policy, in which the People's Republic is recognized as the sole Chinese government, Trump quickly backtracked in a February phone call with his counterpart, Xi Jinping. Still, the aggressive approach Trump has seemed to favor will almost certainly achieve the opposite of what he intends. Beijing officials have already warned they would retaliate against U.S. imports if Trump hikes tariffs on Chinese goods, sparking a trade war that would be destructive for both parties. Similarly, if Trump labels China a "currency manipulator," as he's vowed to do, he'll be picking a fight with Beijing over an issue that is, at the moment, almost irrelevant to U.S.-China relations.

A better option would be carefully targeted tactical weapons. One method is to use reciprocity as a guideline—in other words, match Beijing's restrictive policies with similar measures on Chinese activities in the U.S. That could protect vital know-how from falling into Chinese hands, press Beijing to open its market, and counteract undue advantages the government gives Chinese business. For instance, in sectors where China throws up barriers to foreign companies, Washington should impose the same on Chinese companies in the U.S. Washington could also take a page from Beijing's playbook by identifying and protecting critical technologies and strategic companies.

"U.S. policies should expand to take into account the differences between the U.S. and Chinese systems," argues James McGregor, author of *One Billion Customers: Lessons From the Front Lines of Doing Business in China*.

Washington has already been moving in that direction. Members of Congress have called for greater government scrutiny of Chinese acquisitions of American assets in industries as diverse as agriculture and entertainment. The U.S.-China Economic and Security Review Commission, which advises Congress, advocated last year for a ban on purchases of U.S. companies by China's state-owned enterprises, considering them agents of the state. The White House's semiconductor report recommended the government take sterner action to prevent sensitive chip technologies from being acquired by Chinese investors.

Others say Washington can employ domestic laws and regulations in a broader sense to pressure China. For example, it can apply rules that already allow the U.S. to impose duties on goods dumped, or sold below cost, in the American market to counteract a foreign state that alters the value of its currency in ways that damage U.S. business—if the Chinese try to pull that stuff again. "There are ways to have a more assertive policy toward China that would not single out China," says Jacob Parker, vice president at the U.S.-China Business Council.

There could be pitfalls. China might take its revenge by further hampering U.S. business in China. Or Washington could scare off Chinese investment in the U.S. that could create jobs and revitalize industries.

The bottom line is that the U.S. has to see its economy the way China envisions its own. China is unlike any other country participating in the U.S.-led global economy: It intends to benefit from the openness and security offered by that system without being obligated to abide by its norms. Developing certain industries is perceived as core to China's national security, not something to be left to the whims of shareholders and stock markets. If the U.S. is to win this new economic war, its leaders have

Washington might scare off Chinese investment in the U.S. that could create jobs and revitalize industries



to start thinking more about what is and what isn't good for long-term national interests in dealing with China. Trump may have realized the need for this shift in the relationship. But he's fighting the war with the wrong strategies. **B**

Schuman, a journalist based in Beijing, is the author of *Confucius: And the World He Created*.

Lessons From Mongolia's Bust

The mineral-rich country must diversify its economy to rely less on mining



Not so long ago, Mongolia had the world's fastest-growing economy. Now, by almost every metric, it's in a dire fix. Its debt has surged, its currency has plummeted, and its budget deficit has widened alarmingly. Foreign investment has dried up, and economic growth all but ceased. Even the poor antelope are beset by plague. Making matters worse, some enormous bills are coming due. The government, along with a state-backed development bank, is on the hook for more than \$1 billion in maturing bonds over the next year. By one account, locals are so anxious they're donating their horses to help avoid default.

Thankfully, better options are available. In mid-February the government started negotiating with the International Monetary Fund for a bailout, its sixth in less than three decades. China also may be willing to lend a hand—at a price. Yet even if it avoids default, Mongolia should stand as a cautionary tale for the ages.

Sitting on expansive mineral reserves and sharing a long border with the world's second-biggest economy, Mongolia long looked like an appealing place to invest. Its economy grew by 17 percent in 2011, as its mines churned out huge amounts of coal and copper to meet Chinese demand.

Ominously, though, government spending rose by 56 percent the same year. With interest rates abnormally low, Mongolia was one of many not-so-creditworthy countries able to borrow on attractive terms as investors pursued higher yields. In 2012 it issued \$1.5 billion in Chinggis bonds to splurge on public works. It boosted pay for civil servants and subsidized mortgages. Politicians doled out cash. Luxury boutiques, fancy hotels, and immodestly large statues began to dot the steppe.

Then China's economy slowed, commodity prices plunged, and Mongolia found itself in a bind. Growth halted, and debt mounted. With foreign exchange reserves dwindling, a balance-of-payments crisis was staved off only with help from the People's Bank of China.

A new IMF lifeline would avert a default, but Mongolia needs more than that. It must diversify an economy that depends on mining for almost a quarter of its output and 90 percent of its exports. This in turn requires better schools and new overtures to foreign investors, whom the government has antagonized in recent years. Curbing corruption would help.

Attend to all this, and Mongolia's future still looks bright. It has a young population, a mostly stable democracy, and even an embryonic startup scene. The IMF reckons its mineral deposits may yield \$3 trillion over time. An expansion of the immense Oyu Tolgoi mine, now under way, should soon pay hefty dividends. Accepting some pain today will help ensure those riches are well-used. It might also bring Mongolia's wild economic gyrations to an end.

Who Watches the Banks Under Trump?

Departing Fed Governor Tarullo was leading the efforts to prevent another financial collapse

Almost a decade after a devastating financial crisis, the U.S. remains poorly prepared for a repeat. So it's unsettling that Daniel Tarullo, the Federal Reserve Board official who has done the most to make the country's banks stronger, plans to step down—and all the more important that President Trump find a worthy replacement.

The 2008 crisis exposed weaknesses at the heart of the U.S. financial system. Big banks had far too little loss-absorbing capital, and shortages of cash forced emergency asset sales that added to their losses. The government had no option but to rescue them at taxpayer expense.

Tarullo led efforts to strengthen the system. The Fed adopted capital requirements significantly more demanding than those laid down by international regulators and tied them to liquidity rules aimed at ensuring banks would always have enough cash to meet their near-term obligations. It introduced stress tests designed to assess banks' ability to weather a crisis and demanded that banks produce "living wills" describing how they could go bust without causing wider harm.

Tarullo's work is far from done. On average, the largest U.S. banks now have about \$6 in equity for each \$100 in assets, according to international accounting standards. That's more than in 2007, but it's still not enough. The stress tests aren't yet sufficiently realistic. Tarullo had a plan for improving them, but he won't be around to see it through. And the living wills still give the public too little information.

Tarullo seems optimistic about what will happen after he leaves. He says Trump's "core principles" for financial regulation—which include avoiding bailouts and addressing systemic risk—are a "good starting point." Trump now has three vacancies to fill on the Fed's board of governors. Let's hope he chooses someone capable of finishing what Tarullo started. **B**

Feel Closer to Artists' Minds with Their Own Voices

Your full access to today's world of art.

Anywhen © Philippe Parreno; Photo © Tate (Jos Humphrys)

Hyundai Commission: Philippe Parreno - Anywhen
Oct 4 2016 - Apr 2 2017, Tate Modern

Brilliant IDEAS

Fortnightly Fridays and weekends on Bloomberg TV
Or catch-up on www.bloomberg.com/shows/brilliant-ideas

f t i #brilliantideas



**Bloomberg
Media**

GEICO.



The other guy.



Helping people
since 1936

24/7 licensed
agents

97% customer
satisfaction

2nd-largest auto
insurer

The choice is yours, and it's simple.

Why enjoy just a slice of an apple when you can have the whole thing?

The same goes for car insurance. Why go with a company that offers just a low price when GEICO could save you hundreds and give you so much more? You could enjoy satisfying professional service, 24/7, from a company that's made it their business to help people since 1936. This winning combination has helped GEICO to become the 2nd-largest private passenger auto insurer in the nation.

Make the smart choice. Get your free quote from GEICO today.

GEICO®

geico.com | 1-800-947-AUTO | Local Office

Some discounts, coverages, payment plans and features are not available in all states or all GEICO companies. Customer satisfaction based on an independent study conducted by Alan Newman Research, 2015. GEICO is the second-largest private passenger auto insurer in the United States according to the 2014 A.M. Best market share report, published April 2015. GEICO is a registered service mark of Government Employees Insurance Company, Washington, D.C. 20076; a Berkshire Hathaway Inc. subsidiary. © 2016 GEICO

Movers

By Kyle Stock

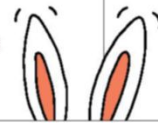
▲ Japan's SoftBank agreed to buy **Fortress Investment Group**, a publicly traded private equity company with \$70 billion in assets, for **\$3.3b**



▲ With almost half of its business coming from "guilt-free" snacks and drinks, **PepsiCo** beat earnings expectations and posted a 5 percent increase in revenue.

▲ Activist investor **Triun Fund Management** bought a **\$3.5b** stake in **Procter & Gamble** as the company sheds struggling brands. It's the fund's largest investment in a single company.

▲ **Allergan** bought fat-freezing specialist **Zeltiq Aesthetics** for **\$2.5b**. The maker of Botox said it would benefit from cross-selling the treatments.



▲ After a year fully clothed, **Playboy** models are going **topless** again. Chief Executive Officer **Cooper Hefner**, son of founder **Hugh Hefner**, said covering up entirely was a mistake.

▲ **Mattel's American Girl** doll line made its first boy. The company hopes **Logan Everett** boosts AG sales, which were flat in 2016 at **\$570m**

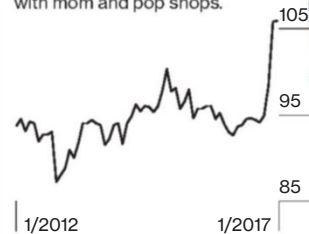


▲ Matching its rivals, **Verizon** is once again offering **unlimited data plans** on its cellular network. Telecom shares dipped as investors grew skittish about a price war.

▲ **Rumor**, a German shepherd from Wisconsin, recovered from a 2016 loss to win **Best in Show at the Westminster Kennel Club Dog Show** in New York. She beat 2,798 other dogs.



▲ The **National Federation of Independent Business's optimism index** hit its highest point since **December 2004**. Talk of a tax cut is playing well with mom and pop shops.



Ups



▲ **Kirin Holdings** sold its **Brazilian beer business**, including 12 breweries, to **Heineken** for **\$1.1 billion**. Although the company had 9 percent of the local beer market, it took a \$1 billion impairment charge for the unit as the economy slipped into recession in 2015.

Downs

▼ **Rovio Entertainment**, the Finnish maker of **Angry Birds**, said it may reduce its staff of 400 by almost 10 percent as it struggles to repeat the success of its breakout game.

▼ **Aetna** and **Humana** agreed to walk away from their **\$37b** merger after losing an antitrust ruling last month. **Aetna is paying Humana a \$1 billion breakup fee**. Meanwhile, **Cigna** sued to end a \$48 billion deal with **Anthem**, which countersued to keep the merger alive. A judge temporarily barred Cigna from scuttling the deal.

▼ **Swiss voters rejected a plan to end tax breaks for foreign companies**. The country promised the **Organization for Economic Cooperation and Development** it would abolish the sweetheart rates by 2019.



▼ **Walt Disney** and **Alphabet's YouTube** dropped **Felix Kjellberg**, a viral video star who goes by the name **PewDiePie**, was after the companies found **anti-Semitic jokes and Nazi imagery** in nine of his videos.

▼ **CKE Restaurants CEO Andrew Puzder** withdrew his nomination for **labor secretary** hours before his confirmation hearing. An early **Trump** supporter with no public-service experience, Puzder came under fire for employing an undocumented maid and abuse claims by his ex-wife, who later retracted the allegations.

▼ The price of the **10-year Treasury note** fell, raising yields to **2.51%** after **Chair Janet Yellen** said the **Federal Reserve** would consider raising interest rates as soon as **March**.



6.5k

▼ **Credit Suisse** said it would trim about **14 percent of its jobs** this year as it pays a **\$5.3 billion** settlement over toxic mortgage securities.



▼ **America's tallest dam** is in danger. A **looming infrastructure calamity** has engineers racing to **lower water levels at Lake Oroville** in Northern California, after a partial collapse of the Oroville Dam's main spillway on Feb. 7. Almost **200,000 people** downstream were evacuated.

▼ **National Security Adviser Michael Flynn** resigned on Feb. 13 after making conflicting statements about contact with **Russian officials**. **Donald Trump's campaign staff** had repeated contact with **Russian intelligence officials** during and after the 2016 campaign, according to the **New York Times**.

▼ **Volkswagen** recalled **5,900 Lamborghinis** over potential engine fires. The sports cars cost from **\$400,000 to \$4 million**.





INT'L
STOCKS
IEFA

INSPIRED TO HELP
YOUR START-UP, START.

U.S.
BONDS
AGG

U.S.
STOCKS
IVV

Build for your future with iShares Core funds.

Essential building blocks for the heart of your portfolio at 1/10th the cost of typical mutual funds.¹ Smaller fees mean bigger dreams. Start building at iShares.com/build

INSPIRED TO BUILD.

iShares®
by BLACKROCK®

1. Source: Morningstar, as of 12/31/15. Comparison is between the average Prospectus Net Expense Ratio for the iShares Core Series ETFs (0.11%) and the average Prospectus Net Expense Ratio of active open-end mutual funds (1.24%) available in the U.S. (excluding municipal bond and money market funds) on 12/31/2015. Visit www.iShares.com or www.BlackRock.com to view a prospectus, which includes investment objectives, risks, fees, expenses and other information that you should read and consider carefully before investing. Investing involves risk, including possible loss of principal. Buying and selling shares of ETFs will result in brokerage commissions. The iShares funds are distributed by BlackRock Investments, LLC (together with its affiliates, "BlackRock"). © 2016 BlackRock. All rights reserved. iSHARES and BLACKROCK are registered trademarks of BlackRock. All other marks are the property of their respective owners. iS-18917-0916



Should Farmers Fear Him?

► Trade barriers would hobble grain and soybean exports

► “Almost everything that’s a bulk crop goes overseas”

Kirk Liefer is readying his soybeans for shipment down southern Illinois’s Kaskaskia River. The Kaskaskia feeds into the Mississippi, which, to a great extent, feeds China: About one-quarter of the U.S. crop goes straight to the world’s biggest food market, where it gets eaten by half the planet’s pigs and provides cooking oil for a rapidly growing middle class.

“Our soybeans go to China, a lot of the corn goes to Japan or Mexico,” says Liefer, 39. “Almost everything that’s a bulk crop goes overseas. You take that away, you ripple through the entire region.”

U.S. farmers and agribusinesses are wary of the protectionism driving the trade policy of President Donald Trump, while rivals are calculating

how doors closed by the U.S. could open markets for them. David MacLennan, chief executive officer of **Cargill**, the world’s largest grain trader, says the U.S. “cannot wall ourselves off” from world markets. He warns that protectionism can “provide famine, cause conflict and even war.”

The view is different from Brazil, where Agriculture Minister Blairo Maggi, whose family owns one of the nation’s biggest soybean shippers, says his country “is back in the game,” competing for sales it had conceded to the U.S. Now the Trump administration may slow the adoption of Asian trade pacts, giving Brazil an opening.

The outcome could be a shift away from America, the world’s traditional breadbasket. Brazil, Australia, Russia,

and Ukraine are well-positioned to profit from any American disruption. “You’re shooting yourself in the foot,” says Joe Glauber, a former chief economist for the U.S. Department of Agriculture and chief U.S. negotiator on farm issues during the Doha Round of global trade talks. “If a supplier starts to be seen as unreliable, the global supply chain adjusts, and that player will lose market share going forward.”

Unlike sectors such as manufacturing, where trade deals are blamed for job losses, U.S. agriculture has benefited from globalization. Sales of U.S. corn, soybeans, cattle, and other commodities will reach \$134 billion in the 2017 fiscal year, up from \$129.7 billion the year before, according to the USDA. This year, Canada and Mexico will account for \$39.6 billion of U.S. farm trade, or 31 percent.

About half of all global corn exports are grown in the U.S. Almost half of all U.S. wheat, half of its soybeans and rice, and three-quarters of its cotton are shipped abroad.

The U.S. is the world’s top exporter and highly competitive. Still, America’s export share is declining as rivals catch up in technology and infrastructure. Russia, once a grain importer, surpassed the U.S. in wheat exports for the first time last year, and the two countries are neck and neck this year. Brazil is rising in soybeans, thanks to weather that allows two crops per year and land that’s yet to be fully developed.

U.S. farmers need exports to keep already low commodity prices at home from collapsing. Gluts have pushed down corn prices to less than half their 2012 peak, and farmer profits may fall for the fourth straight year, the longest streak since the 1970s, the government said on Feb. 7.

That’s why U.S. farmers have backed trade deals such as the Trans-Pacific Partnership, which promised an additional \$4 billion to \$5 billion of sales by opening Pacific Rim nations to U.S. meat, dairy, and grain. But pulling out of the TPP was one of Trump’s first acts as president. He’s also threatening to leave the North American Free Trade Agreement with Canada and

◀ Mexico. Both moves stoke worries that attempts to protect manufacturing could harm farmers, with countries such as China retaliating against taxes on finished goods exported to the U.S. by buying commodities elsewhere, says Ed Schafer, who served as agriculture secretary under President George W. Bush. “Trade issues are not as simplistic as President Trump thinks,” he says.

Bob Young, chief economist for the American Farm Bureau Federation, the largest U.S. farmers group, rattles off a series of competitors ready to eat the U.S.’s lunch: Brazil and Argentina in global corn and soybean markets; Ukraine and Russia in grain and oilseeds; Australia and New Zealand in meat and dairy.

Australia is still pushing for a TPP without the U.S., to lock in potential trade gains in Asia. Europe is buying more Ukrainian corn, enjoying lower tariffs that squeeze out U.S. suppliers who had hoped to gain from a European Union trade deal. Brazil and Argentina are becoming the first choice for Chinese buyers who wait for those nations’ spring harvests—when prices are lower—to make purchases.

Competitors are penetrating markets the U.S. once owned. “Mexico is right on the U.S.’s doorstep, and yet Russian wheat can and does price into Mexico,” says Swithun Still, director at Solaris Commodities, a trader in Russian grain, in Morges, Switzerland.

The U.S. has hurt its farm trade before, says Glauber, the former USDA official. A ban on grain sales to the Soviet Union after its 1979 invasion of Afghanistan jump-started South America’s development, and earlier moves during the Nixon administration

gave Canada, Australia, and South America market opportunities they never relinquished. “You do not want to convince your customers they need to look elsewhere,” Glauber says.

For now, the shipments go on as usual along the Kaskaskia. Liefer says he thinks trade tensions will work out, in part because Trump respects the voters who put him in the White House—rural areas supported the president by a 2-1 margin in November. But he’s watching the new leadership closely. “Where we will be six months from now, that’s a different question,” he says. “I might have a different opinion.” —Alan Bjerga, with Lynn Thomasson

The bottom line The U.S. has the biggest agriculture industry on earth, yet farmers face mounting pressure from Russia, Brazil, and Ukraine.

Fiscal Turmoil

Brazilian Police Strike, And Violence Spikes

▶ **Belt-tightening prompts a walkout in Espírito Santo state**

▶ **“We’re dealing with very unhappy troops”**

Brazilians are feeling the bite of austerity measures that have left public services in parts of the country close to collapse. And many are protesting. The most conspicuous example: the strike by police officers in Espírito Santo, which ended on Feb. 12. During the walkout, which lasted more than a week, crime rates soared across the state just north of Rio de Janeiro state. According to the civil police union,

almost 150 murders were committed, up more than 300 percent from the same period last year.

President Michel Temer condemned the strike as illegal and unacceptable and sent 2,000 federal troops to assist the state. While local television stations broadcast images of looting, many supermarkets and schools remained closed for most of the week. Residents refused to venture out of their homes, and hospitals admitted only emergency patients, according to local media reports.

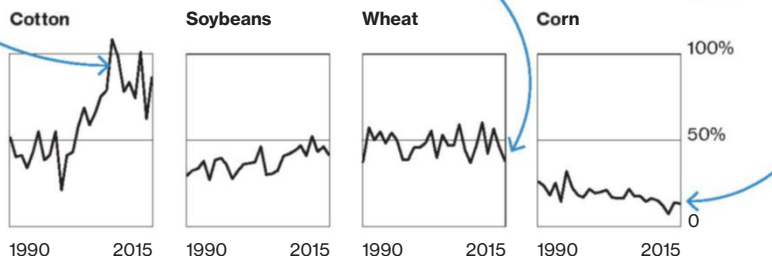
In Rio de Janeiro state, protesters have launched fireworks at cops, burned buses, and torn down fences. The violence was prompted by proposed austerity measures and delays in paying public servants’ salaries. The situation in both states highlights the challenge facing policymakers at all levels as they seek to contain a fiscal crisis.

Six of Brazil’s 26 states are in deep financial trouble, according to Fabio Klein, an expert on government finances with consulting firm Tendências Consultoria. Three of them—Rio de Janeiro, Rio Grande do Sul, and Minas Gerais—have decreed a state of “fiscal calamity” that gives them more time to meet requirements established by the federal law. Klein says the federal government may be forced to issue debt to help rescue the six states facing the deepest problems, as well as highly indebted São Paulo, Brazil’s richest state. “This could have a significant impact on the treasury’s accounts,” he says. “The effectiveness of federal cost-cutting could be limited by the crisis of the states.” Luiz Fernando Pezão, governor of Rio de Janeiro, and Finance Minister Henrique Meirelles have agreed on a plan to provide debt relief to the state in exchange for the privatization of the water and sewage utility, plus austerity measures. Combined, that will be worth 26 billion reais (\$8.4 billion) in 2017. The deal needs the approval of federal and state lawmakers. Violent protests outside the state assembly have continued as legislators debate the package.

With Espírito Santo’s police strike ended, Rio de Janeiro is the next state that could face a walkout. “We’re dealing with very unhappy troops,” Major Ivan Blaz, a spokesman for Rio’s military police, told reporters on Feb. 8. “Add to that the situation of

In 2008 and 2013 the nation drew down stockpiles to export more cotton than it produced

Share of U.S. crop exported





Protesters smash a shop window amid clashes with police in Rio de Janeiro, where the president sent 9,000 troops

neighboring Espírito Santo, and indeed there are mobilizations toward protest, a shutdown.” Family members of Rio’s military police have been staging non-violent demonstrations across the city. But, unlike in Vitória, Espírito Santo’s capital, there’s little work stoppage.

As a result of the disarray in Espírito Santo, the federal government won’t make cuts to public security spending a condition for assistance to the states, according to Thiago de Aragão, a strategy director with political consulting firm Arko Advice. “The situation will lead the government to realize that if states can’t impose more security, this will create a domino effect,” he says.

—David Biller and Walter Brandimarte

The bottom line Brazil’s federal government wants the states to accept austerity measures that local civil servants oppose.

Treaties

Vietnam Shrugs Off the Loss of a Trade Pact

▶ **The export power wants to deepen its regional ties**

▶ **The TPP “is also a driving force for reform”**

Because of its export-driven economy, Vietnam probably would have benefited from the Trans-Pacific Partnership trade treaty more than any other nation. Now that President Donald Trump has withdrawn the U.S.

from the deal, Vietnam is turning to its Asian neighbors.

The end of the treaty “will push us to expand in other markets,” says Nguyen Duc Kien, deputy head of the National Assembly economic committee. “We have a lot of potential to increase exports” to markets in the Association of Southeast Asian Nations and to some “countries where we have bilateral trade agreements, such as Japan.”

The U.S. is by far the largest customer for the apparel, electronics, furniture, and shoes that Vietnam makes and will probably remain so for some time. In five years, Vietnam doubled the value of its exports to the U.S., to \$38.5 billion in 2016. The TPP would have dramatically lowered or eliminated the tariffs the U.S. imposes on Vietnamese goods.

Long before Trump withdrew from the treaty, the Vietnamese were cultivating other ties. “Vietnam is more active than other countries in forging trade deals, and that allows it to diversify its risk,” says Eugenia Victorino, an economist at Australia & New Zealand Banking Group in Singapore.

Vietnam has nine free-trade agreements (FTAs), including deals with India, South Korea, Australia, and New Zealand. Seven more are being negotiated. “We are not so concerned about TPP ending,” says Nguyen Van Tuan, deputy general secretary of the Vietnam Textile and Apparel Association. “We will look at ways to boost exports to the EU.”

Prime Minister Nguyen Xuan Phuc hopes to revive the TPP. If the

trade pact continues to exist in some form, the government can use the agreement’s terms to modernize the economy, says Tran Viet Thai, deputy director general of the Diplomatic Academy of Vietnam in Hanoi, where the country’s foreign service officers are trained. “TPP is not only about market access. It is also a driving force for reform, from legal to labor to transparency and anticorruption,” he says. Australia is interested in resurrecting some version of the partnership with Vietnam and other Asian countries.

The more free-trade agreements that Vietnam signs, the less it will have to rely on China and its Regional Comprehensive Economic Partnership for the benefits of international commerce. “With the U.S. withdrawing from the TPP, there is a vacuum, and China wants to fill it,” Thai says. “But to lead, there has to be give-and-take, and at this moment, China doesn’t want to give,” he says, referring to China’s reluctance to open its markets. “No one wants to give when populism and anti-free-trade sentiments are on the rise.” —*Nguyen Dieu Tu Uyen and Karl Lester Yap*

The bottom line Vietnam has free-trade agreements to compensate for the lower tariffs with the U.S. that the TPP would have provided.

Diplomacy

A Putin Fixer Claims Success With Turkey

▶ **Alexander Dugin says he stepped in after the downing of a fighter**

▶ **“Brilliance and madness are very close to each other”**

The Russian ultranationalist dubbed “Putin’s Rasputin” by Breitbart News when it was run by President Donald Trump’s chief strategist, Steve Bannon, has emerged as an unlikely foreign policy fixer for the Kremlin. Alexander Dugin, whose lengthy beard gives him a passing resemblance to the Siberian mystic who enchanted Czar Nicholas II, says he played a key role in patching up Russia’s relations ▶

◀ with Turkey, an account confirmed by a senior figure in Ankara. He's bullish on better ties with the U.S., now that people more sympathetic to his views are in power.

After Turkey shot down a Russian warplane along the Syrian border in 2015, the philosophical rabble-rouser says he used his contacts in both countries to bring Putin and President Recep Tayyip Erdogan together and help end an increasingly dangerous feud. The rapprochement ultimately opened the door for Russia and Turkey to outmaneuver the U.S. and broker a deal with Syrian President Bashar al-Assad that has turned the tide in the civil war. The agreement also moved Russia a step closer to fulfilling Dugin's vision of Eurasianism, a rejection of the U.S.-led globalist system that calls for luring Turkey, traditionally a U.S. ally, away from NATO and creating a Russo-Islamic pact that includes Iran.

Having no official role in the government, he says, makes him an effective go-between in matters of state. Dugin, whose father was a Soviet military intelligence official, was blacklisted by the U.S. for aiding the insurgency in Ukraine. He's advised members of Russia's government and written a textbook on geopolitics that's been used by the military. "I can talk to people like an official can't," he says in his Moscow office at Tsargrad TV, where he's a commentator and chief editor.

Dugin lost his prestigious job running the sociology department at Moscow State University in 2014 after activists accused him of encouraging genocide in a rant in support of separatists in Ukraine in which he said, "Kill, kill, kill." The Kremlin, which gave Dugin prominent airtime on major networks to cheerlead during the 2014 annexation of Crimea, has kept him at arm's length since he criticized Putin for not taking more of Ukraine. Putin spokesman Dmitry

Peskov denies Dugin's role in the détente with Turkey.

"He's seen as a brilliant philosopher, but brilliance and madness are very close to each other," says Sergei Markov, a political consultant to Putin's staff. "He appears to have given the Turks some very good advice."

Dugin's writings, in dozens of books and on countless blogs, have made him an influential thinker in Turkey and Iran, where he's a frequent visitor, and among anti-establishment parties throughout the West. "Three countries pay the most attention to me—Turkey, Iran, and the U.S.," he says. The foreword to one of his books was written by a retired American humanities professor, Paul Gottfried, one of the first political philosophers to use the term "alternative right" to describe the radical conservative movement. In a video address to a Vatican conference in 2014, Bannon defended the traditionalist views espoused by Dugin and other nationalists who want "sovereignty for their country."

Dugin's role in resolving the crisis with Erdogan over the warplane incident was confirmed by Ismail Hakki Pekin, a former head of Turkish military intelligence. Pekin was one of five members of Turkey's Patriotic Party, including two other retired generals, who flew to Moscow in December 2015 for secret meetings that Dugin arranged with current and retired Russian officers. Dugin took the Turkish delegation to meet his benefactor, Konstantin Malofeev, a multimillionaire with ties to the Russian Orthodox Church. Pekin says Dugin introduced Malofeev as Putin's "right-hand man" and that the Turks came to learn the financier can "knock on Putin's door." "That's how the trip became effective," Pekin says. "We knew what we said went directly to Putin."

Dugin sought out the retired Turkish generals because they all had a history of opposing Erdogan's policies and spent time in jail for alleged plots to overthrow the government, Pekin says, which made them more credible.

In March, Dugin flew to Ankara for a follow-up visit that included talks with relatives of Erdogan and other powerful figures. Dugin says he told the Turks that arresting the person accused of shooting and killing one of the Russian pilots as he tried to parachute to safety would go a long way toward reestablishing relations. The next day, March 30, the suspect was taken into custody. "They said they were carrying out an investigation and that Erdogan would apologize," says Dugin, who passed the information on to Russian officials. Three months later, with Turkey's economy squeezed by Russian trade curbs, Erdogan expressed regret over the incident, paving the way for resumed ties. (Malofeev dismisses the assertion he's Putin's right-hand man; Peskov, the Kremlin spokesman, denies the financier played a role in the talks.)

Dugin has delighted in Russia's and Turkey's involvement in the Syria crisis. Erdogan, with Putin's blessing, sent troops into Syria in August to fight Islamic State and U.S.-supplied Syrian Kurdish militia forces, which Turkey views as terrorists for their links to the Kurdistan Workers' Party. And Turkey blocked rebel supplies into Aleppo, enabling Assad's forces, backed by Russian firepower, to capture the former commercial capital in December. In January, Russia and Turkey carried out coordinated air strikes against Islamic State targets.

Dugin, who's long predicted the demise of what he calls "the West's liberal hegemony," says Trump's election promises to change the course of world history. "America not only isn't an opponent, it's a potential ally under Trump," he says. Now his focus turns to Europe, where he's been cultivating ties with anti-establishment parties. With key elections in France, Germany, and the Netherlands this year, the Russian polemicist's mantra for Europe is ripped straight from Trump's playbook: "Drain the swamp." —Henry Meyer, with Onur Ant

The bottom line Ultranationalist TV commentator and editor Dugin sees America as a potential ally to Russia, thanks to Trump's victory.

B Edited by Christopher Power and Dimitra Kessenides
Bloomberg.com

Dugin



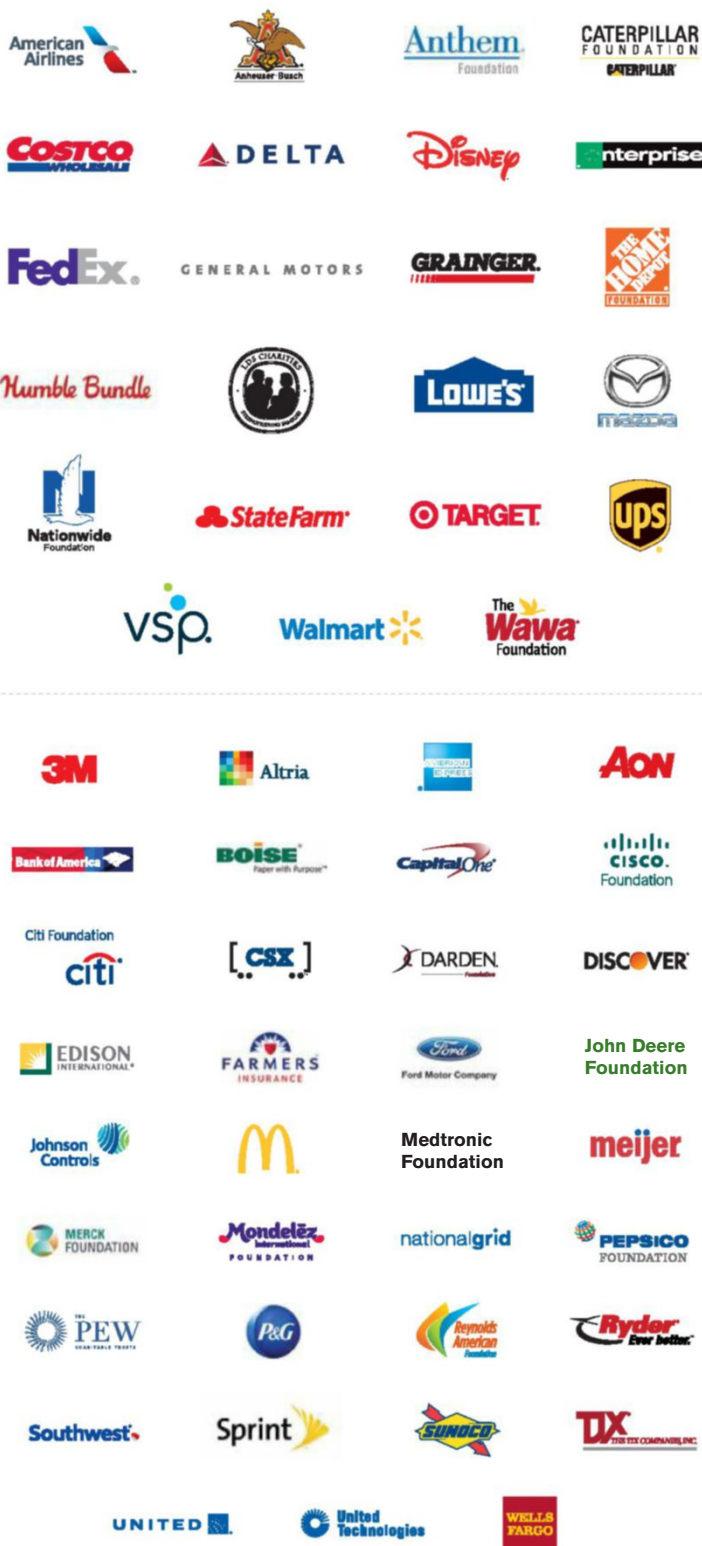
**American
Red Cross**

Our Annual Disaster Giving Program members help make it possible for the American Red Cross to be prepared for and respond to disasters when they strike. Their generous pre-investment means families have comfort and hope after a devastating event, like a home fire or natural disaster.

Thank you

We couldn't do it without you.

Annual Disaster Giving Program Members



Support disaster relief today
at redcross.org



**America's emblem
stands for great strength
and long life.**

With that in mind, let's talk retirement.

The Spirit of America™

Visit us at mutualofamerica.com or call us at 1-866-954-4321.

MUTUAL OF AMERICA
Your Retirement Company®

Mutual of America® and Mutual of America Your Retirement Company® are registered service marks of Mutual of America Life Insurance Company, a registered Broker/Dealer, 320 Park Avenue, New York, NY 10022-6839.



How to Lose \$6 Billion

► A botched nuclear bet pushes Toshiba to near financial ruin

► "It's the end of Toshiba as a company with any hopes to grow"

Since its founding in 1873 as Japan's first maker of telegraph equipment, **Toshiba** has survived a litany of challenges, from the Great Kanto earthquake of 1923, to having its factories bombed into rubble during World War II, to the drubbing of the Zune music player it co-developed with Microsoft. Now the conglomerate may be undone by four nuclear power plants under construction in the American South. Blown deadlines and budgets at the reactors in Georgia and South Carolina overseen by Toshiba's Westinghouse Electric subsidiary resulted in the resignation of Toshiba Chairman Shigenori Shiga on Feb. 14 and a 712.5 billion yen (\$6.3 billion) writedown on its nuclear reactor business.

That charge to cover cost overruns at

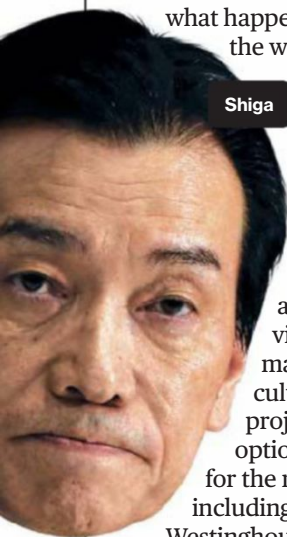
Westinghouse eclipses the \$5.4 billion that Toshiba paid for the company in 2006. The financial fallout of the nuclear business's collapse is far greater. To stay afloat, Toshiba says it may have to sell a majority stake in its last remaining crown jewel: its flash-memory business, which makes chips used in smartphones and solid-state disk drives. The company already sold off its consumer electronics and medical equipment businesses following an accounting scandal in 2015.

"Toshiba is being torn apart," says Amir Anvarzadeh, head of Japanese equity sales at BGC Partners in Singapore. "It's going to survive, it's not going to go bankrupt. But it's the end of Toshiba as a company with any hopes to grow."

Many investors apparently agree.

The company, which had already lost \$7 billion in market value over the past six weeks, saw its shares fall an additional 10 percent after the announcement of the write-down and Shiga's departure. Another worry for the markets is that the huge Westinghouse charge will cause the company's shareholder equity to drop to negative 150 billion yen for the current year ending in March, according to Toshiba forecasts.

Besides Toshiba investors, there's another group of big losers: advocates of nuclear power, who had high hopes for Westinghouse, which in 2008 became the first U.S. company to win nuclear power plant construction permits since the 1979 Three Mile Island accident. But the nuclear renaissance Toshiba bet on never materialized, in ►



Shiga

◀ part because the company couldn't build reactors along the timelines and within the budgets it had promised. It had anticipated that Westinghouse's next-generation AP1000 modular reactor design would be easier and faster to execute—just the opposite of what happened. In a briefing after the writedown announcement, Toshiba President Satoshi Tsunakawa said the company may now pull out of nuclear plant construction altogether and only provide equipment and engineering services, which would make it extremely difficult for it to sell nuclear projects to customers. All options are on the table for the nuclear business, including a possible sale of Westinghouse, he said.

"There's billions and billions of dollars at stake here," says Gregory Jaczko, former head of the U.S. Nuclear Regulatory Commission (NRC). "This could take down Toshiba, and it certainly means the end of new nuclear construction in the U.S."

All this is a humiliating turn of events for one of Japan's oldest businesses, which made the country's first light-bulb and grew into a behemoth that manufactured everything from washing machines and medical equipment to computers and nuclear power plants.

When Toshiba bought Westinghouse a decade ago, the U.S. Congress had just started dangling loan guarantees and other incentives aimed at restarting a dormant nuclear industry. Westinghouse in 2008 signed deals to build four reactors for utilities **Southern Co.** and **Scana**. In a 2015 interview with *Bloomberg Businessweek*, Southern Chief Executive Officer Thomas Fanning said his utility's two reactor projects at Plant Vogtle in Georgia were "going to be one of the most successful megaprojects in modern American industrial history."

To build that megaproject, Westinghouse turned to Baton Rouge, La.-based Shaw Group, a newcomer to nuclear work. Shaw was founded in 1987 by James Bernhard Jr., who paid \$50,000 for the assets of a bankrupt

pipe fabricator and expanded the company via one acquisition after another. In 2000 he swooped in at a bankruptcy auction and bought Stone & Webster, an engineering company that had built MIT's campus and many U.S. nuclear plants from the 1950s to the 1970s. Stone & Webster was a shell of its old self at the time of Bernhard's purchase, but the name gave Shaw new credibility in the nuclear field, helping it win all of Westinghouse's contracts.

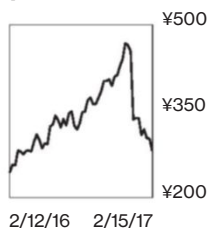
After Westinghouse hired Shaw to handle construction in 2008, it wasn't long before Shaw's work came under scrutiny. By early 2012, NRC inspectors found steel in the foundation of one reactor had been installed improperly. A 300-ton reactor vessel almost fell off a rail car. The wrong welds were used on nuclear modules and had to be redone. Shaw "clearly lacked experience in the nuclear power industry and was not prepared for the rigor and attention to detail required," Bill Jacobs, Georgia's project monitor, told the state's public service commission in 2012. Bernhard declined to comment for this story.

In July 2012, Shaw agreed to sell itself for \$3.3 billion to **Chicago Bridge & Iron**, a much larger engineering company that wanted in on the expected nuclear resurgence. Three years later, after seeing little progress, CB&I sold the bulk of Shaw's assets to Toshiba for \$229 million—accepting the significantly lower price in exchange for shedding liabilities related to the projects.

In April 2016, just four months after the deal closed, Toshiba accused CB&I of inflating the worth of Shaw's assets by \$2.2 billion and asked to renegotiate. CB&I balked and sued Toshiba for breach of contract last July. A preliminary decision in

favor of Toshiba's request to renegotiate. CB&I has appealed that ruling. "We remain confident this issue will come to a resolution favorable to CB&I," says Gentry Brann, a spokes-

Toshiba stock price



woman for the company. CB&I has argued that at least some of the problems were the fault of Westinghouse and its AP1000 designs.

Besides taking the writedown to reflect its troubled U.S. projects, Toshiba says it will make more "strategic" decisions concerning overseas nuclear operations and will continue mulling the sale of its stake in **NuGeneration**, a company that seeks to develop a nuclear plant in North West England. As for its plans in India, where Westinghouse was slated to build six reactors, Toshiba said it now intends to supply parts and engineering services for the atomic units but won't take on construction duties.

And what of the U.S. nuclear renaissance? Westinghouse's stumbles on the projects for Southern and Scana, the nuclear disaster in Fukushima, Japan, and a flood of cheap natural gas that's lowered U.S. power prices have made new reactors increasingly expensive and risky. Of the 30-odd applications for reactors that started in the mid-2000s, only the four Westinghouse units have gone forward. In hindsight, that's a contest Toshiba surely wishes it hadn't won. —*Jason Clenfield, Yuji Nakamura, Takashi Amano, Pavel Alpeyev, and Stephen Stapczynski*

The bottom line After a bad investment in nuclear reactor construction, Toshiba is taking a \$6.3 billion charge and may be selling part of its chip business.

Autos

VW's Latest Woe: A Reliance on Mexico

▶ **After \$23 billion in fraud costs, the carmaker needs to expand**

▶ **Any border tax is "going to make us noncompetitive"**

Among the almost 400 cars on the lot at Emich Volkswagen in Denver are about 90 Tiguan, the automaker's small sport-utility vehicle that sells for \$26,000 and up. The cars—Pacific blue, Reflex silver, black pearl, and more—are for now all imported from Germany. Owner Fred Emich's Tiguan are a hit with his Rocky Mountain customers, thanks to their all-wheel drive capability, making his store one of the top-selling Tiguan dealerships in the U.S. But Emich knows that within a few miles in any direction buyers can



"We will be significantly stepping up our activities in the U.S. Our goals are high, and our strategy is very ambitious."
—Herbert Diess
VW brand chief

find similar SUVs from **Ford**, **Nissan**, or **Honda** built in the U.S. that sell for \$3,000 to \$5,000 less. And that's before the "big border tax" that President Trump has been tweeting about or the border adjustment tax on imports some Republicans in Congress are pushing. Such a levy "would be catastrophic," Emich says.

More than any of its major rivals, **Volkswagen** has counted on free trade throughout North America as it's planned manufacturing there. Until recently, the company made only one model in the U.S.—the Passat, in Chattanooga, Tenn. The rest of its cars are produced in Europe or at its sprawling factory in Puebla in central Mexico. Recognizing that the Tiguan is more expensive than its peers, Volkswagen last year decided to shift production of a new, larger version of the model for U.S. buyers to Mexico—but that won't do Emich and other dealers any good if a border tax is imposed. "It's already a struggle where we're priced," Emich says. "If we increase that, it's going to make us noncompetitive."

The automaker's Chattanooga facility completed a \$900 million expansion in December to build a new \$30,000 large SUV called the Atlas that goes on sale this spring. The factory can produce 250,000 vehicles a year. The Puebla plant, by contrast, can churn out 600,000 a year—and is responsible for about 60 percent of Volkswagen's U.S. sales. The factory, opened in the 1960s to produce Beetles, is the company's biggest outside its hometown of Wolfsburg, Germany.

Volkswagen's vulnerability to a border tax could increase now that its Audi unit, which doesn't have a U.S. plant, opened a factory in the central Mexican city of San José Chiapa in late September. Audi plans to export about a third of the Q5 SUVs produced in the facility to the U.S. Premium-priced Audi, which has posted seven straight years of record U.S. sales, is the primary source of Volkswagen's operating profit.

While companies such as **Mazda** and Jaguar Land Rover parent **Tata Motors** have no U.S. factories and are arguably most at risk, Volkswagen appears to be in the worst position among big

carmakers to adjust production should there be a trade war. Nissan, which made 850,000 vehicles in Mexico last year as the country's largest auto producer, also manufactured 1 million cars at its two U.S. vehicle assembly plants. While **BMW** and **Daimler** are developing Mexican plants, they both already have sizable operations in the U.S. Daimler owns Oregon-based Freightliner trucks. It also produces Mercedes cars and SUVs in Alabama and Sprinter vans in South Carolina. BMW's largest factory worldwide is in South Carolina, where it builds SUVs for global export and is expanding output to 450,000 units a year. Honda makes almost 70 percent of the vehicles it sells in the U.S. at its four American factories. Even **Fuji Heavy Industries**, parent of Subaru, relies on U.S. production for about 40 percent of its sales here.

A border tax couldn't come at a worse time for VW. The company has agreed to pay more than \$23 billion in fines and settlements—including up to \$10 billion for a vehicle buyback—after it admitted to cheating on diesel emissions tests. Even before the cheating was revealed, Volkswagen had struggled in the U.S., where its namesake brand accounted for less than 2 percent of new auto sales last year.

One reason for the meager performance: The cars were often too small or too expensive for American tastes. And Volkswagen missed out on the SUV craze that's fueled record sales in the U.S. Only now is VW introducing the Atlas and the larger Tiguan—just as signs emerge that the market is cooling after seven straight years of growth.

The diesel scandal undermined VW's efforts to gain traction with buyers, tarnishing its image and damaging relations with the regulators that the company misled for years about emissions. That gives the automaker little room to ask officials to go easy on them, says Dave Sullivan, an analyst with consulting firm AutoPacific. "They don't have the ability to ask the government for any type of favors or help right now," he says.

Still, Volkswagen isn't totally defenseless. It retains cultural cachet in the U.S. among some Americans who fondly associate the brand with *Herbie*, the *Love Bug* and the hippie-era

Microbus. It also can point to a growing presence in Chattanooga, where the Atlas expansion boosted employment to 2,800 from 2,400 last summer, with more hiring under way.

Volkswagen declined to make any executives available for this story or to comment on the potential impact of import taxes, but the company has made clear it's not giving up on America. "We will be significantly stepping up our activities in the USA," VW's global brand chief, Herbert Diess, said in November. "Our goals are high, and our strategy is very ambitious."

Along with expanding its stable of SUVs, Volkswagen says it has reorganized its North American corporate structure to give its U.S. unit greater autonomy in deciding what models to build and how they should be priced and equipped. "Volkswagen needs to spend a lot of time in the U.S., and they need to regain the U.S. consumer," said Arndt Ellinghorst, the head of automotive research at investment bank Evercore ISI on Bloomberg TV. Regardless of Trump administration trade risks, "the incremental investment for Volkswagen will probably come in the U.S." —*Ryan Beene and Christoph Rauwald*

The bottom line Most of Volkswagen's cars sold in the U.S. are made in Germany or Mexico, making it particularly susceptible to any U.S. border tax.

Entertainment

Music Festivals Have A Volume Problem

▶ **With too many events crowding the calendar, some are failing**

▶ **"There are only so many dollars to go around"**

As the musical duo Big Grams took the stage at the Bonnaroo Music & Arts Festival last June, Antwan Patton, better known as rapper Big Boi, looked out at the crowd in Manchester, Tenn., and saw an audience that had shrunk by half from his last appearance in 2011.

Bonnaroo, named best festival by *Rolling Stone* in 2008, has a reputation as one of the nation's most

Companies/Industries

◀ successful and innovative music events. Yet ticket sales reached an all-time low in 2016—dropping 46 percent from 2011—and the festival lost several million dollars, according to people familiar with Bonnaroo’s finances who asked not to be identified. “What we did last year didn’t resonate with the fan base,” says Joe Berchtold, chief operating officer of **Live Nation Entertainment**.

Live Nation, the world’s largest concert promoter, which bought a stake in Bonnaroo in 2015, has sunk millions of dollars into improving physical facilities such as bathrooms and will have U2 perform its iconic album *The Joshua Tree* at this June’s event.

The U.S. concert business has been growing 10 percent annually for a decade, and 32 million people attend at least one festival every year. But many music industry executives say Bonnaroo’s struggles worry them. If one of the premier music events in North America has difficulty making money, that trouble might be contagious.

Several smaller country music festivals—including Live Nation’s Farmborough in New York—have folded. Sweetlife, a festival started by food chain **Sweetgreen**, has also shut down. Just two years ago, it expanded to a second day and booked rapper Kendrick Lamar, one of the hottest acts in the business. Attendance at Sasquatch!, a leading festival in the Pacific Northwest, fell about 40 percent in 2016. It’s booked reclusive crooner Frank Ocean to lift sales this year.

The closures and strains all point to a glut, promoters and agents say, with the least creative festivals suffering the most. “There will be more cancellations,” says Evan Harrison, chief

executive officer of concert promoter **Huka Entertainment**. “The market got saturated, and there are only so many dollars to go around.”

Huka stages two of the more popular festivals in the world, Pemberton, in July in British Columbia, and Tortuga, in April in Fort Lauderdale. Tortuga, a country festival, grossed \$6.7 million in 2016—18th among all festivals in the world, according to concert tracker Pollstar. The event takes place at a prime time and in a prime location and blends stars with up-and-coming acts. “Having a destination location is important,” Harrison says. “You don’t build brand or loyalty if you aren’t doing a bunch of things differently.”

After a year in which critics complained about the quality of Bonnaroo’s lineup, Live Nation shifted control of booking musical talent from **AC Entertainment**, which co-founded the festival, to **C3 Presents**, the promoters behind Austin City Limits and Lollapalooza.

Live Nation needs a couple of years to have an impact, Live Nation’s Berchtold says. “Bonnaroo is a great brand and means something to fans across the country and internationally,” he says. “How we’re now approaching booking

it and investments we’ve made in [the] physical site, which needed some renewal, will bring that brand back to what it has been.”

The modern era of U.S. music festivals began in the early 1990s when musician Perry Farrell co-founded Lollapalooza as a touring event. (It later settled in Chicago full time.) Coachella, Bonnaroo, and Austin City Limits followed.

Although the festivals lost money at first, Coachella and Lollapalooza now sell out every year—often before their lineups are announced. They also hold a special pull with artists. Beyoncé will play Coachella in April while seven months pregnant, then disappear for the rest of festival season. Coachella took in \$94 million in 2016, which makes it the second highest-grossing festival in the world, following Desert Trip. Meanwhile, raves including Tomorrowland, Electric Daisy Carnival, and Ultra have turned electronic dance music into a profitable business.

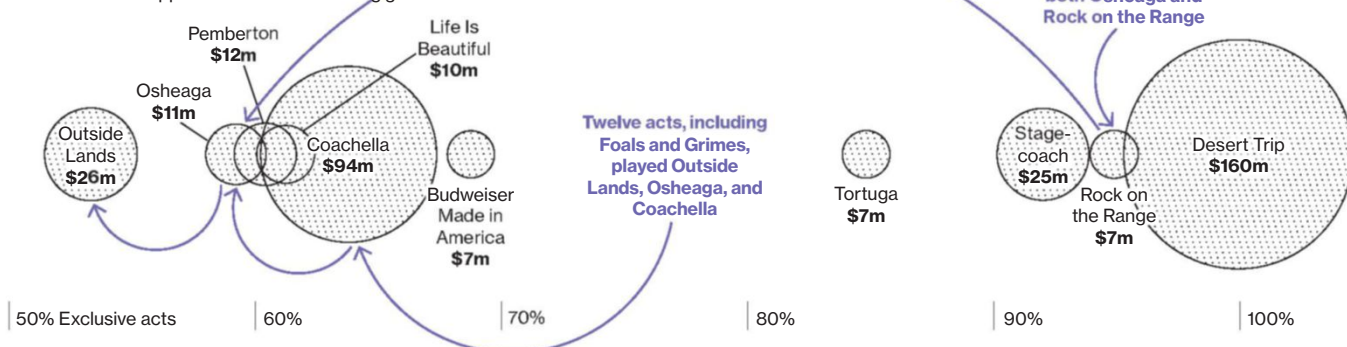
Over the past few years, Live Nation has also taken stakes in the promoters of Electric Daisy Carnival and BottleRock, as well as Austin City Limits and Lollapalooza. Rival **Anschutz Entertainment Group**, which owns



DJ Calvin Harris playing at Coachella 2016

Same Old Songs in 2016

A third of the acts at the 10 top-grossing festivals in North America appeared at more than one gig



Coachella, has also been on a buying spree, acquiring the promoters responsible for the Hangout Music Festival in Alabama and Firefly in Delaware.

For a well-run festival, the finances can be lucrative. While promoters and ticket sellers have to share revenue with artists on a regular tour date, festival operators control every aspect of the event, from parking to food, and pay artists a flat fee.

A big promoter such as Live Nation can also use the same team of salespeople for every event and reduce the cost of talent by booking the same acts into multiple festivals. "It's superhard for independents," Harrison says. "We don't have the back-office efficiency to make the economics more attractive."

The consolidation of festival ownership has a downside: Lineups become homogenized. Big Grams performed at five festivals last year, while the DJ trio Major Lazer received top billing in at least six in the U.S. British electronic act Disclosure played at Lollapalooza, Coachella, Sasquatch, and Firefly.

"There aren't too many festivals—there are just not enough good festivals," says Randy Phillips, CEO of **LiveStyle**, promoter of Tomorrowland and Electric Zoo. "Festivals are lineup-driven, and if you don't have a great lineup, you're screwed." —*Lucas Shaw*

The bottom line Ticket sales at Bonnaroo fell by almost half last year, a sign that even hit festivals are suffering from a glut of events.

Consumer

Toys 'R' Russia? Retailer Detsky Mir Says, 'Da'

▶ **A successful IPO for a kids' chain augurs an economic recovery**

▶ **Russians "spend a larger share of income on their children"**

Anna Krutevich looks over the displays of diapers, Hot Wheels, and baby food at **Detsky Mir**, a children's emporium in Moscow's Aviapark shopping mall, then pulls juice and milk from a shelf. Although the past two years have been tough as Russia has slogged through a recession, she still spends 15 percent of

her salary on her toddler even as she scrimps on other purchases. "My son remains my priority," she says.

It's consumers such as Krutevich that Detsky Mir is counting on after a Feb. 8 stock offering that valued the company at almost \$1.1 billion. While Russian consumer spending has plunged, Detsky Mir—the name means "children's world"—has opened more than 200 stores over the past two years, boosting its 2014 revenue of 45.5 billion rubles (\$795 million) by almost 30 percent annually while increasing gross profits per square meter of floor space. The chain plans an additional 250 stores over the next three years, bringing the total above 700, and online sales are booming.

The 70-year-old retailer, which for decades had its flagship across the street from the KGB's headquarters, reinvented itself in the early 2000s to focus on the emerging middle class. Today, it offers everything from strained carrots to bicycles to frilly party dresses in stores that often feature entertainment areas where kids play with Lego and Nerf balls. That formula has gotten parents to spend even as a recent Nielsen poll found that 84 percent of Russians say, "This isn't the best time to spend money."

There hadn't been a major initial public offering by a Russian consumer company in almost three years. The Detsky Mir IPO, which raised \$355 million and has been trading near its offering price, suggests investors are ready to come back to Russia. Billionaire Vladimir Evtushenkov, chairman of Sistema, the chain's parent, shelved an IPO for Detsky Mir in 2014 after Russia's annexation of Crimea spooked investors. But today, the economy is recovering, and chilly relations between Moscow and Washington are warming up with Donald Trump's presidency.

Children's retailers have fared better than others during the downturn in part because of rising birth rates, nudged by a government "maternity capital" program that pays women as much as 453,000 rubles for each child after their first. And Russians, even in hard economic times, "are willing to

spend a larger share of income on their children" than parents in many other countries, says Yulia Bychenko, head of research at the Ipsos Comcon survey group in Moscow.

One worry for investors is that big-box stores could start eating into Detsky Mir's business, as the likes of Walmart and Target did to Toys "R" Us in the U.S. Fallout from other business dealings involving Evtushenkov, who in 2014 spent several months under house arrest in a murky dispute over an oil company deal, could also affect Detsky Mir's prospects. And even consumers like Krutevich say they're being cautious with spending. "I need to be more selective," she says, noting she now tries to buy clothing only when it's on sale.

Morgan Stanley analysts, though,

are bullish on the company. They say Detsky Mir's scale lets it negotiate deals with suppliers and landlords, helping the chain keep prices lower than those at smaller rivals. While the weak ruble,

which has lost almost half its value against the dollar since 2014, forced Detsky Mir to raise prices on imported goods, some foreign-branded products such as Procter & Gamble's Pampers diapers are produced in Russia.

The chain has diversified beyond toys, which fell to 28 percent of sales in 2016 from 39 percent in 2010. It's repositioned some higher-priced items, such as Lego blocks, as "educational and developmental" aids, guessing correctly that parents might spend more on such products. Through a 2012 acquisition, Detsky Mir owns 45 Early Learning Centres specializing in educational games and toys. And just as important, it benefits from its Soviet legacy, says Oleg Kuzmin, strategy director at Landor Associates, a branding consultant in Moscow. "It was *the* brand for children," he says. In children's retailing, "consumers want to know who they're buying from, and trust is very important."

—*Carol Matlack and Ilya Khrennikov*

The bottom line Children's products retailer Detsky Mir's \$355 million IPO could be a harbinger of better times for Russia's consumer companies.

B Edited by James E. Ellis and David Rocks
Bloomberg.com



Bloomberg Podcasts

Retail voyeurism.



Let's peek inside other people's shopping carts.
Then let's talk about it. You can listen.

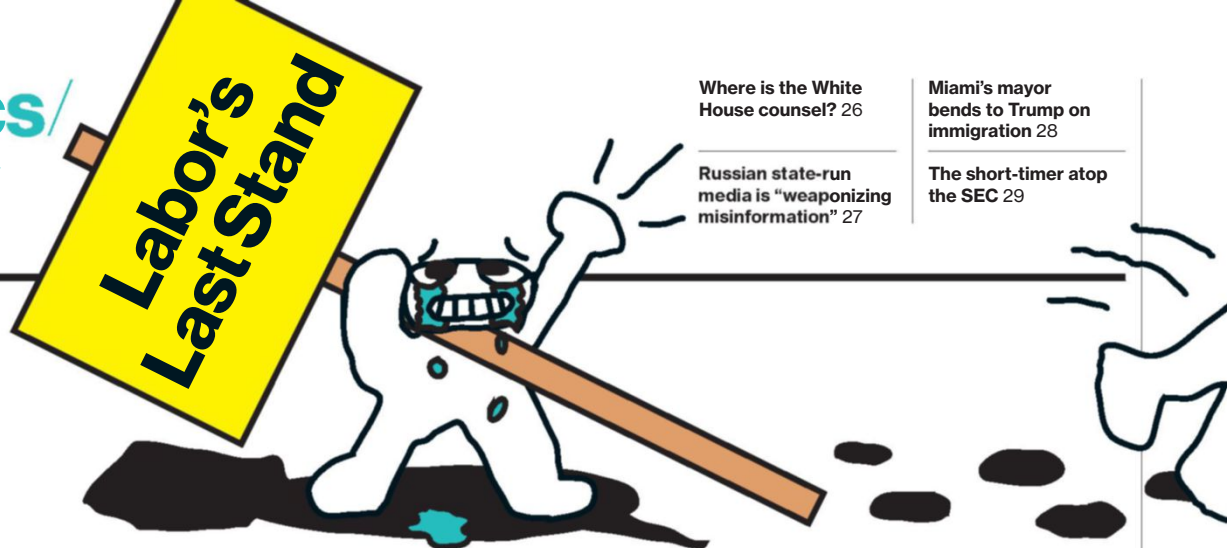
New episodes twice monthly.



Get it on
iTunes



GET IT ON
Google Play



Where is the White House counsel? 26

Miami's mayor bends to Trump on immigration 28

Russian state-run media is "weaponizing misinformation" 27

The short-timer atop the SEC 29

► Unions are losing the fight over mandatory fees

► "People aren't scared of them the way they used to be"

Last year the total share of U.S. workers who belong to a union fell to 10.7 percent, a record low. That number could go a lot lower in the next few years. Following decades of declining membership, unions face an existential crisis as right-to-work laws being pushed at state and federal levels would ban their ability to collect mandatory fees from the workers they represent, a key source of revenue for organized labor.

Once largely confined to the conservative South, right-to-work is encroaching on unions' longtime strongholds in the North and Midwest and, pending a U.S. Supreme Court ruling, could soon cover a majority of the unionized workforce in the U.S. Following a 47-year lull, six states in five years have passed right-to-work laws. "The South is clearly winning this particular civil war," says University of California at Santa Barbara historian Nelson Lichtenstein.

In their first weeks in office, the new Republican governors of Kentucky and Missouri have already signed right-to-work laws, making them the 27th and 28th states, respectively, to ban mandatory union fees. By mid-February, New Hampshire's House of Representatives will vote on a proposal, endorsed by the state's Republican governor and already approved by its Senate, to become the first right-to-work state in the Northeast. In Iowa, where right-to-work is already the law, Republicans are looking to further curb unions' power with a bill restricting public employees' collective bargaining rights.

"Organized labor—it's really the man behind the curtain in *The Wizard*

of Oz," says Matt Patterson, who directs Americans for Tax Reform's Center for Worker Freedom, an anti-union non-profit. "People aren't scared of them the way they used to be." Right-to-work is now the law in almost every state where Republicans control the governorship and the state legislature. The only exception other than New Hampshire is Ohio, where a sweeping anti-union law was successfully overturned by a referendum in 2011.

The most expansive change is likely to come from the Supreme Court, whose 5-4 conservative majority will be restored if the Senate confirms Neil Gorsuch to fill Justice Antonin Scalia's seat. Before Scalia's death last year, unions were bracing for a likely defeat

in *Friedrichs v. California Teachers Association*, a case brought by teachers and conservative groups who argued that mandatory union fees violate government employees' constitutional rights. Without Scalia, that case deadlocked at 4-4, but several similar suits are pending in lower courts.

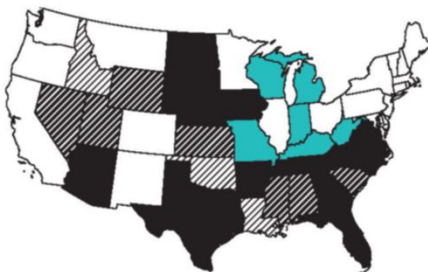
Labor leaders expect the issue could reach the Supreme Court in time for a ruling this year, making right-to-work the law of the land for the entire public sector, which employs about half the 14.6 million U.S. union members. "There's not a doubt in my mind that the clock is ticking on that one," says Greg Junemann, president of the International Federation of Professional & Technical Engineers. Service Employees International Union President Mary Kay Henry, who before Scalia's death said her union was preemptively "preparing to become a voluntary organization," sent staff a memo after Donald Trump's election win announcing that the union would plan for a 30 percent cut in its budget, almost all of which comes from dues and fees.

Unions have been trying to get ahead of the challenge. Since 2013 staff members and activists from the 1.6 million-strong American Federation of State, County, and Municipal Employees have conducted 600,000 one-on-one conversations with workers covered by AFSCME contracts. AFSCME officials say they reached a sobering conclusion in 2015 about how the workers it represents might behave under right-to-work: While roughly 35 percent would likely pay dues no matter what, about half could be "on the fence." The remaining

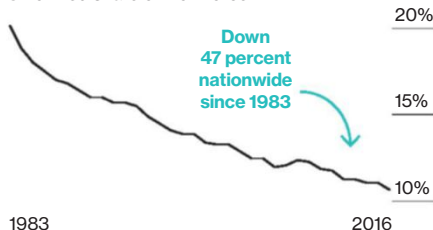
Collective Retreat

Right-to-work legislation takes effect

■ 1944-48 ■ 1952-63 ■ 1976-2001 ■ 2012-17



Unionized share of workforce



◀ 15 percent or so would likely not pay dues under right-to-work. “We’ve found that at times we were treating all of our 1.6 million members as if they were activists, and they aren’t,” says AFSCME President Lee Saunders. “We were taking some things for granted.”

AFSCME says it’s overhauled how it communicates with workers, including targeting its e-mails and Facebook ads so those who are lukewarm on the union are more likely to get information about obtaining a free associate’s degree through the union than to see a call to action with an upraised fist.

The unionization rate in right-to-work states is less than half the rest of the country’s. Organizers say letting workers decline to pay fees defunds unions, diverts staff resources that could otherwise be devoted to growth, and divides workers—just as Congress intended when it passed the 1947 Taft-Hartley Act allowing states to pass right-to-work laws. By 1964, 20 states had banned mandatory fees. After that the map stayed nearly static for almost half a century, with just three more states passing right-to-work and one repealing it.

Then, after the 2010 midterm elections, unions’ flagging political clout and Republicans’ newfound dominance in state government ushered in a surge of right-to-work laws, beginning in 2012 in Indiana and spreading to

Biggest drops in unionization

Since 2000

| | |
|------------------|------|
| 1 South Carolina | -62% |
| 2 Wisconsin | -54% |
| 3 Louisiana | -42% |
| 4 Georgia | -40% |
| 5 Tennessee | -37% |

onetime union bastions Michigan and Wisconsin. Each new law lets conservatives in neighboring states claim they need to follow suit to compete for business. And labor’s failure to deliver on prom-

ises to oust right-to-work backers has helped embolden Republicans elsewhere.

Republicans in Congress have introduced a bill to make the nation’s entire private sector right-to-work. Although it’s unlikely to pass unless Republicans abolish the filibuster, private-sector unions like the Communications Workers of America say they’re preparing for the potential loss of mandatory fees. Mark Mix, president of the nonprofit National Right to Work Committee, says he jokes with his

staff members about updating their résumés. Once right-to-work is a nationwide policy, he says, the 62-year-old organization will have completed its mission. “As soon as we pass this bill,” says Mix, “we’re clearing house.” —*Josh Eidelson*

The bottom line Right-to-work laws are encroaching on unions’ longtime strongholds in the North and Midwest.

The Presidency

Amid Chaos, Trump Needs a Strong Lawyer

▶ **White House Counsel McGahn has been conspicuously absent**

▶ **He doesn’t seem to be “one of the people the president listens to”**

In less than a month, the Trump White House already has spawned a litany of ethics and legal controversies: potential conflicts of interest created by the president retaining ownership of his businesses, court challenges to his executive order on immigration, and the ouster of National Security Adviser Michael Flynn, to name just a few.

All of these issues fall within the purview of one senior Trump aide, White House Counsel Donald McGahn, who’s enjoyed a degree of anonymity that’s beginning to erode as the political circus in Washington shows no sign of settling down. “He’s either one of the architects of this mess, giving bad advice,” says Nicholas Allard, a longtime Washington attorney who’s now the dean of Brooklyn Law School, “or more likely, based on what I know about his intelligence and experience, he’s siloed off and is not one of the people the president listens to.”

On Feb. 14, White House spokesman Sean Spicer placed McGahn at the center of the Trump team’s internal discussions on whether Flynn told the truth about his interaction with Russia’s U.S. ambassador in December. At a news briefing, Spicer confirmed that on Jan. 26, then-acting Attorney General Sally Yates told McGahn that she believed Flynn misled White House colleagues about his communication with

the Russian envoy, making him vulnerable to blackmail.

McGahn immediately informed Trump about Flynn’s lack of candor, leading the president to order the White House counsel to conduct a legal “review” of the situation, Spicer said, adding that McGahn concluded that Flynn hadn’t violated the law. “The issue pure and simple came down to a matter of trust,” Spicer said. “That’s why the president asked for his resignation, and he got it.”

On a matter that’s neither pure nor simple, Spicer’s won’t be the last word on the Flynn imbroglio—or McGahn’s reported determination that Flynn didn’t break any laws. One issue is whether the retired lieutenant general violated a statute barring private citizens from interfering with diplomatic relations between the U.S. and foreign governments. U.S. intelligence agencies and the FBI are investigating the full extent of contacts that Trump’s advisers and associates had with Russia during and after the 2016 campaign, according to four national security officials with knowledge of the matter. The *New York Times* reported on Feb. 14 that people close to Trump made repeated contact with Russian intelligence officials during the campaign.

McGahn, 48, a well-known election-law attorney who practiced privately in the Washington office of the corporate law firm Jones Day, advised Trump during the campaign. From 2008 to 2013, McGahn served as a member of the Federal Election Commission, where he tried to reduce regulations limiting campaign spending. “He will play a critical role in our administration,” Trump said of McGahn after November’s election. In response to a request for comment, a White House spokeswoman said McGahn “does not do interviews.”

Jack Goldsmith, a Harvard Law School professor and former senior Justice Department official under President George W. Bush, drew a connection between questions about McGahn’s role in the Flynn affair and the counsel’s performance related to other controversies. “Other questions will and should be asked about what McGahn has done to enforce ethics rules,” one of the main responsibilities of a White House counsel,



Goldsmith wrote on Feb. 14 on a blog called Lawfare. The professor pointed to episodes such as senior Trump adviser Kellyanne Conway urging Fox News viewers to buy presidential daughter Ivanka Trump's brand of clothing and accessories.

The White House counsel typically leads the ethics vetting of cabinet nominees, a step in the appointment process to which the Trump administration apparently paid little attention, Goldsmith observed. The failure led to embarrassing revelations such as Andrew Puzder, Trump's pick to head the Department of Labor, acknowledging that he'd employed an undocumented immigrant to clean his house. Puzder withdrew from consideration on Feb. 15.

Another core duty of the White House counsel is overseeing executive orders. Trump's order curbing immigration from seven predominantly Muslim countries sparked numerous protests and a so-far-successful court challenge. The failure to phrase the order in a way that would insulate it from attack shows either that McGahn failed as an attorney or he wasn't listened to. In another illustration of executive order disarray, the *New York Times* has reported about Trump's "anger that he was not fully briefed on details" of an order giving his chief strategist, Steve Bannon, a seat on the Principals Committee of the National Security Council.

"The White House counsel is supposed to be more than a traffic cop," says Stephen Vladeck, a professor at the University of Texas School of Law. "He's supposed to keep the president's agenda from getting derailed by obvious distractions." So far that's not happening, says Vladeck. "The million-dollar question is whether that's because Don McGahn is ineffective or deeply on-board with everything that's going on."

Some White House counsels have distinguished themselves as sage advisers. Clark Clifford played that role for Harry Truman, and Ted Sorensen did the same for John Kennedy. By contrast, Richard Nixon's first three counsels—John Ehrlichman, Chuck Colson, and John Dean—all served prison time for their participation in the Watergate scandal. In November, President Obama said that when he met with Trump after the election, he told him that having



France's Macron has surged in the polls—and become the target of Kremlin-controlled news agencies

a strong White House counsel "would eliminate a lot of ambiguity."

Trump's public expressions of disdain for the judiciary—after losing a round in the immigration ban litigation, he tweeted his condemnation of the "so-called judge" who ruled against the government—make it all the more important that he have a strong White House counsel, says Allard. "This president needs someone to instruct him on the rule of law and respect for the law."

—Paul M. Barrett

The bottom line White House Counsel Donald McGahn has yet to show he can steer President Trump away from making obvious mistakes.

Media

The Kremlin's New Disinformation Machine

► **Russia's state-run media battle Western outlets for global influence**

► **Sputnik and RT "make it their daily business to put out fake news"**

As French centrist presidential candidate Emmanuel Macron began surging in polls recently, his campaign was hit by a report calling him a "U.S. agent" and hinting that he's a homosexual who's backed by a "very wealthy gay lobby." The source? Sputnik, a news agency controlled by the Kremlin.

In a throwback to Soviet-era propaganda efforts, Russia's sprawling state-run media empire is buzzing ahead of elections this year in the Netherlands, France, and Germany—putting Europe's political establishment on alert after intelligence agencies accused Russia of meddling in the U.S. presidential race. Sputnik and RT, a state-owned global

TV network, "make it their daily business to put out fake news," Richard Ferrand, secretary-general of Macron's En Marche! party, told France 2 television on Feb. 13.

In Germany, the Kremlin's global media operation is giving lavish coverage to populist far-right and leftist parties critical of Chancellor Angela Merkel's open-door immigration policy. In France, Macron's sudden rise has undercut the candidacy of conservative François Fillon, a former prime minister who's called for warmer relations with the Kremlin and an end to sanctions on Russia. Stories by Sputnik and RT have been largely sympathetic to Fillon, who's been hurt by allegations that he gave his wife and children no-show government-paid jobs, and to Marine Le Pen of the far-right National Front, stressing her pro-Russian and anti-European views. Both outlets have been harder on the pro-European Macron, suggesting that the former economy minister used his position to help foreign banks and companies.

Sputnik, a reincarnation of the Soviet-era Novosti Press Agency, operates in dozens of languages. RT, a multilingual network that styles itself as Russia's answer to CNN or Al Jazeera, is run by an appointee of President Vladimir Putin.

With 22 bureaus around the world and a staff of 1,000, RT has seen its budget jump from \$30 million in 2005 to about \$320 million this year, even as most other government spending has been slashed in a recession. Its current budget includes \$20 million to start a French-language channel, expected to begin operating later this year, adding to its English, Spanish, German, and Arabic services.

"We see a country that, in weaponizing misinformation, has created ►

◀ what we might see now as the post-truth age,” U.K. Defense Minister Michael Fallon warned in a Feb. 2 speech. The West must “do more to tackle the false reality.”

Russia dismisses the criticism as hypocrisy. Putin, who says RT’s mission is to “break the Anglo-Saxon monopoly” on global news, said on Feb. 9 that leading European media had turned into “a weapon for manipulating opinion.” Kremlin spokesman Dmitry Peskov on Feb. 14 said the attention the Russian outlets are getting is testament to their success and urged foreign media to “avoid fake news when we talk about RT and Sputnik.” Both RT and Sputnik denied spreading any false stories about the French election.

The Kremlin’s information tools have already made their mark in Italy and the Netherlands. A few weeks before a December referendum that toppled Italian Prime Minister Matteo Renzi, RT broadcast live footage on Facebook of what it said were anti-Renzi protesters massing in Rome, which attracted 1.5 million viewers and was widely shared on social media, according to Italian daily *La Stampa*. In fact, they were Renzi supporters. In the Netherlands, Sputnik last year posted a video allegedly made by Ukrainian extremists threatening to attack Dutch people who voted “no” on closer ties between Ukraine and the EU. Ukrainian authorities and independent analysts say the video was faked.

RT’s impact may be limited. The channel is “very polemical, ideological, and anti-Western, especially anti-American,” says Ellen Mickiewicz, a Duke University political science professor who’s studied RT. She says only about 1 percent of RT’s YouTube videos—which the company says have gotten more than 4 billion views—are political and that its TV audience is tiny. In Britain in January, RT had 0.05 percent of viewers, fewer than the Welsh-language Channel 4. So the hundreds of millions of dollars spent on RT can seem like “wasted money,” Mickiewicz says.

Ofcom, the British media regulator, has found RT in breach of impartiality standards 10 times—more than any other broadcaster—since the channel started operating in the country in 2005. Most incidents took place in the past two years, with violations involving

stories on NATO, Ukraine, and Turkey, and one reporting that the BBC had faked news of chemical attacks in Syria.

Germany in 2015 got a taste of how quickly Russian disinformation can spread. In January, Russian state broadcaster Channel One reported the alleged gang rape of a 13-year-old ethnic Russian girl by immigrants in Germany. The story—recycled by RT and Sputnik even after German police established that no rape took place—brought tens of thousands of Russian speakers living in Germany into the streets to protest Merkel’s immigration policy.

RT broadcasts have reached up to 1 million views on social media, according to Stefan Meister, an analyst at the German Council on Foreign Relations in Berlin. “Of course,” he says, “those posts can reverberate within the echo chambers of anti-EU, anti-NATO, and anti-U.S. groups.” —*Henry Meyer, Carol Matlack, and Stefan Nicola*

The bottom line The Kremlin-run RT television network has seen its annual budget jump from \$30 million in 2005 to \$320 million this year.

Immigration

Miami’s Mayor Climbs Aboard the Trump Train

▶ **The county may need billions in federal funds for a transit system**

▶ **“If you don’t comply with federal law, you can lose”**

He’s the immigrant mayor of Miami-Dade County—where most people speak a foreign language at home and half the population was born abroad—and he voted for Hillary Clinton. Yet Mayor Carlos Gimenez is

falling in line with President Trump’s demands on immigration, and many of his constituents are furious.

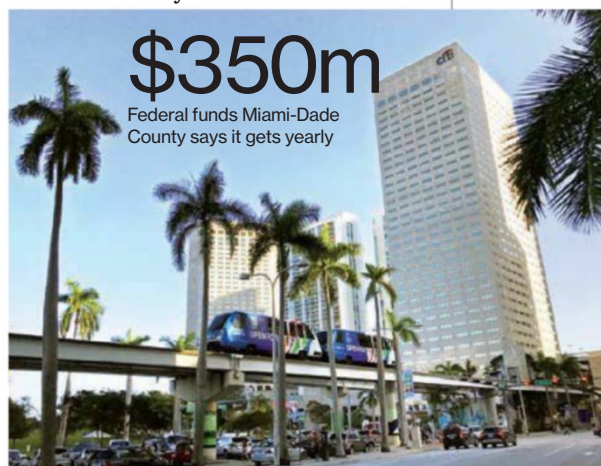
After Trump threatened to curtail federal funds to so-called sanctuary cities that protect illegal immigrants from federal immigration laws, Gimenez quickly eliminated the policy that had landed Miami-Dade on a list of sanctuary jurisdictions. But even amid growing uproar in the community, the mayor is clear about his motive: It’s all about the money.

The second-term Republican needs federal funds to make good on one of his signature campaign promises—to build an expansive mass transit system to connect downtown to Miami Beach and several suburbs. When Trump put out his order on Jan. 25, threatening to withhold funds from disobedient mayors, Gimenez got on board. “I said, ‘You know what? I think this gentleman is serious,’” he told a local ABC affiliate. “Money is in jeopardy, because there is a law that says if you don’t comply with federal law, you can lose.” Gimenez says Miami-Dade relies on \$350 million in federal funds every year and will try to get hundreds of millions—“if not billions of dollars”—for the transit system.

Sean Foreman, a political science professor at Barry University in Miami Shores, Fla., sees parallels between the mayor’s decision and moves by companies such as **Ford** and **United Technologies**, which made deferential gestures after Trump blasted offshore manufacturing. “It’s political expediency,” he says. “If you want to get anything done for your business or for your municipality, you have to fall in line.”

That rationale hasn’t appeased the scores of protesters who have shown up at county hall. The county commission is holding a special meeting

on Feb. 17 to consider the mayor’s memorandum rolling back the city’s sanctuary status. At issue is whether jails should keep people beyond normal periods because federal immigration authorities want to question them. Since 2013, Miami-Dade had refused to do so unless it was reimbursed by the



federal government, a policy that typically led to most people being let go.

Gimenez insists the move represents a minor shift in policy. Still, the change wasn't lost on Trump, who tweeted, "Miami-Dade mayor dropped sanctuary policy. Right decision. Strong!" In the first two weeks under the new policy, the mayor's office noted that Miami-Dade got 34 detainer requests from the federal government. That compares with 174 for all of 2016.

Even if Gimenez gets the federal funds, questions remain as to how he'll obtain the land for the transit project, which would cut across hundreds of acres of private property. "So yes, if we end up solving transportation issues in this community, the mayor will come out very popular," Foreman says. "But there's a low likelihood of success." —Jonathan Levin, with Paul Murphy

The bottom line Miami-Dade's mayor is avoiding a clash with Trump over immigration because he needs federal money for mass transit.

The Transition

SEC's Acting Chair Acts Like He Runs the Place

► Piowar rolls up his sleeves while Clayton awaits confirmation

► "We're not going to sit by and do nothing"

Serving as acting chairman of a federal agency is the Washington equivalent of being all dressed up with nowhere to go. The temporary position doesn't entail much aside from keeping the seat warm until the new boss arrives.

But that's not how the acting chairman of the U.S. Securities and Exchange Commission, Michael Piowar, sees it. While President Trump's permanent SEC chairman nominee, Jay Clayton, awaits his Senate hearing, Piowar is taking full advantage of his temporary powers.

Since being elevated from his post as an SEC commissioner on Jan. 23, Piowar has started to roll back two controversial regulations, promoted his staff to more senior roles, and even hired a press aide. He's also taken the seat-warming mission literally, moving a

few doors down the hall into the chairman's spacious office suite, which has an impressive view of the U.S. Capitol. "We're not going to sit by and do nothing," says Piowar, a Republican, who joined the SEC in 2013. "We have an important mission we need to continue."

Piowar's activism is unusual, especially considering that, if things go smoothly, Clayton could be sworn in by late March. And he has virtually no chance to push through major rule changes. That's because the only other commissioner now at the agency is Kara Stein, a Democrat. (Three other seats on the commission are vacant.) Stein, not known for her pro-business leanings, would have to vote to approve any changes.

The SEC makes rules by majority vote, but the chairman still controls the agenda and can direct its staff to work on certain projects. Piowar is using that authority to push for deregulation, in line with much of what the White House has outlined. His first policy announcement, eight days after being named acting chief, was to order a review of a 2012 SEC rule that requires companies to disclose whether their products use so-called conflict minerals mined in the Democratic Republic of the Congo and other nearby countries. Piowar says the regulation is misguided and that "legitimate mining operators are facing such onerous costs to comply with the rule that they are being put out of business."

Piowar also began an attack on an SEC regulation that calls for companies to report how their chief executive officer's pay compares with average workers'—a requirement that corporate America almost universally opposes. The rule, which Piowar voted against in 2015, went into effect in January, and companies are preparing to report the numbers for the first time. Citing "unanticipated compliance difficulties" that he says companies are having, Piowar asked for public comments on the process, adding that the rule may need to be adjusted.

He also hasn't been shy about assuming the trappings of the job. He's updated his bio on the SEC website to note the promotion and

"He's got handcuffs as to doing anything definitive. But he seems to be having fun."
—Edward Fleischman, a former SEC commissioner

hung the framed proclamation from the White House designating him acting chairman in his temporary office. Lawyers working for Piowar were given the title co-chief of staff of the SEC.

Others who have served as acting SEC chairman have been more laid-back as they awaited their permanent successors. Cynthia Glassman, a Republican appointed by George W. Bush, says she didn't move into the bigger office and doesn't recall being swayed by the perks. She did have access to the chairman's designated car and driver for official business and enjoyed the title for the five weeks she was in charge. "It was fun to be called chair, even for a short amount of time," she says.

Glassman made sure the regular business of the commission contin-



Piowar is taking steps to roll back regulations while serving as the SEC's acting chair

ued apace, presiding over regular enforcement and senior staff meetings. As for policy, she also faced a deadlock between the Republican and Democratic commissioners. Further complicat-

ethics lawyers prevented her from discussing policy with Christopher Cox, the incoming chairman. "It was an awkward position to be in," Glassman says. While Piowar's spokesman didn't respond to questions about whether he'd been told not to discuss SEC business with Clayton, a person close to the nominee says there's been no coordination.

Another former SEC commissioner, Edward Fleischman, held the chair for several days in the late 1980s, with instructions, he recalls, "to keep the ship afloat and make sure nothing untoward happens." He notes that Piowar appears to have a different assignment. "He's got handcuffs as to doing anything definitive," Fleischman says. "But he seems to be having fun." —Robert Schmidt, with Ben Bain

The bottom line Michael Piowar is enjoying the trappings of his temporary position at the SEC, including moving into the chairman's office suite.

Schwab just lowered the cost of investing. Again.

\$6.95

Online Equity Trades¹

+

Satisfaction Guarantee

How much is your broker charging you?

| | Schwab | Fidelity | TD Ameritrade | E*TRADE | Scottrade | Vanguard |
|--|---------------|----------|---------------|---------|-----------|--|
| Online Equity Trades | \$6.95 | \$7.95 | \$9.99 | \$9.99 | \$7.00 | \$7 - \$20 depending on number of trades |
| Options per contract, plus base commission | \$0.70 | \$0.75 | \$0.75 | \$0.75 | \$0.70 | \$1.00 |
| Satisfaction Guarantee | YES | NO | NO | NO | NO | NO |

Competitor firm information is standard pricing obtained from their respective websites as of 1/31/17. Competitor pricing and offers subject to change without notice.

Do you know how much you're paying in fees? Do you get them back if you're not satisfied? Ask your broker, and if you don't like their answers, ask again at Schwab.

Learn more at schwab.com/compareus



Own your tomorrow.

Schwab ranked "Highest in Investor Satisfaction with Full-Service Brokerage Firms."

Brokerage Products: Not FDIC Insured • No Bank Guarantee • May Lose Value

1. Restrictions apply: The \$6.95 commission does not apply to foreign stock transactions, large block transactions requiring special handling, or restricted stock transactions. Foreign ordinary shares that trade online in the U.S. over-the-counter (OTC) market and do not settle in the U.S. will have a \$50 foreign transaction fee added to the cost of the transaction. All broker-assisted and automated phone trades are subject to service charges. See the Charles Schwab Pricing Guide for Individual Investors for full fee and commission schedules. Employee equity compensation transactions are subject to separate commission schedules. Multiple leg options strategies will involve multiple commissions.

If you are not completely satisfied for any reason, at your request Charles Schwab & Co., Inc. ("Schwab") or Charles Schwab Bank ("Schwab Bank"), as applicable, will refund any eligible fee related to your concern within the required timeframes. Schwab reserves the right to change or terminate the guarantee at any time. Go to schwab.com/satisfaction to learn what's included and how it works.

Options carry a high level of risk and are not suitable for all investors. Certain requirements must be met to trade options through Schwab. Please read the Options Disclosure Document titled "Characteristics and Risks of Standardized Options" before considering any option transaction. Call Schwab at 1-800-435-4000 for a current copy. Supporting documentation for any claims or statistical information is available upon request.

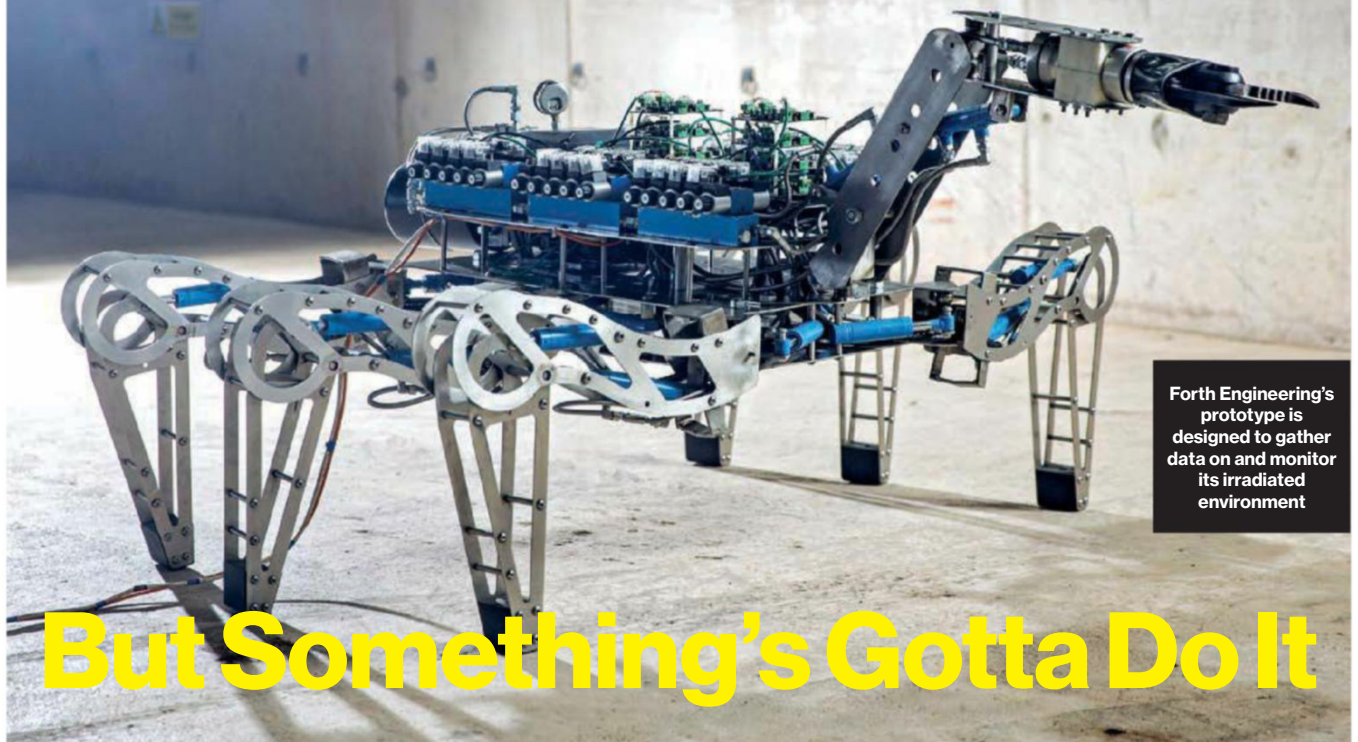
Charles Schwab received the highest numerical score in the J.D. Power 2016 Full Service Investor Satisfaction Study, based on 6,006 responses from 20 firms measuring opinions of investors who used full-service investment institutions and were surveyed in January 2016. Your experiences may vary. Visit jdpower.com

Charles Schwab & Co., Inc. and Charles Schwab Bank are separate but affiliated companies and subsidiaries of The Charles Schwab Corporation. Brokerage products are offered by Schwab, Member SIPC. Deposit and lending products and services are offered by Charles Schwab Bank, Member FDIC and an Equal Housing Lender.

©2017 Charles Schwab & Co., Inc. All rights reserved. Member SIPC. (0217-TA1E) ADP95736-00

February 20 — March 5, 2017

It's a Dirty Job,



Forth Engineering's
prototype is
designed to gather
data on and monitor
its irradiated
environment

But Something's Gotta Do It

► The U.K. looks to drones to help mind its nuclear waste

► A new model of cleanup bot “will make its own decisions”

To enter Europe's largest nuclear site, a visitor must be wearing construction coveralls, steel-toed boots, a hard hat, and a pager-size device that rings if radiation levels get too high. Contamination enters the body through open wounds, so any cuts must be bandaged with medical tape. On the way out, after you remove your protective gear, a security guard sweeps your body with a handheld detection device to make sure nothing latched on. It's as unsettling as it sounds.

This is Sellafield, on the coast of the Irish Sea, more than 300 miles north (and a bit west) of London. At the dawn of the Cold War, the U.K. chose this site as the place to begin enriching uranium for its first nuclear weapon. But in the

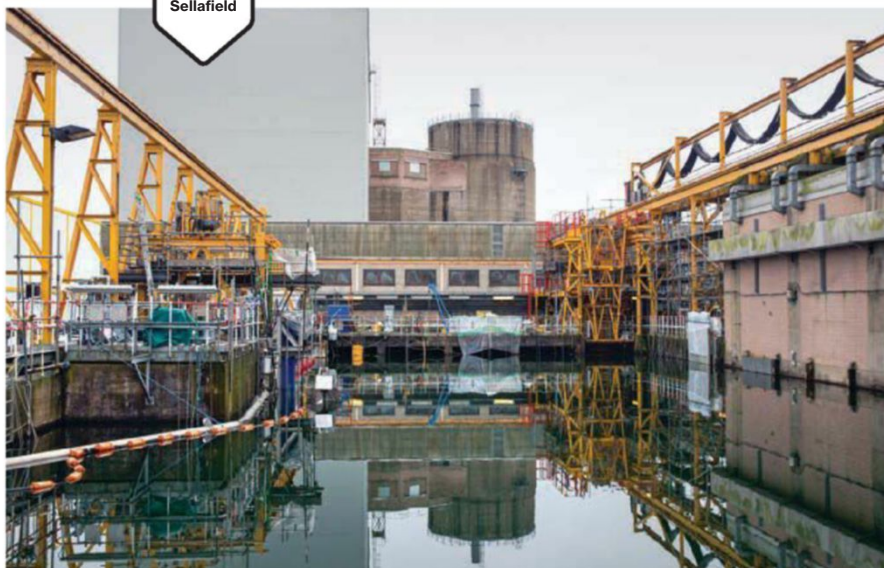
country's haste to build a bomb, little thought was given to disposing of the waste. Much of it was placed in concrete ponds larger than Olympic swimming pools. In 1957 a reactor fire contaminated the local countryside and a devastating meltdown was narrowly avoided.

Generations later, scientists, engineers, and government officials are still grappling with the leftover waste. The concrete ponds, surrounded by dilapidated and moldy scaffolding, are filled with murky green water that keeps the waste cool. Hundreds of tons of radioactive material are in the structures, risking leaks into the soil or a fire. The area has been classified an “intolerable risk” for falling short of modern safety standards, a

problem that must be addressed over the next two decades. “There is a time imperative,” says Rebecca Weston, Sellafield's technical director.

That urgency is leading Weston and her colleagues to seek help from robots, an important step for the delicate business of nuclear waste. Advances in software and hardware engineering are allowing machines to reach contaminated areas that humans could never survive. The U.K. government is spending about £2 billion (\$2.5 billion) a year at Sellafield, helping make the otherwise sleepy countryside region of West Cumbria an unexpected proving ground for nuclear decommissioning technology. “I've traveled in Korea and Japan, ►

Sellafield



► The Sellafield nuclear waste site in northern England is an unusual proving ground for hardy robots



▼ A submersible VideoRay robot steers through one of Sellafield's contaminated waste pools



◀ to Fukushima, and West Cumbria is looked at as a technology hub," says Mark Telford, managing director for **Forth Engineering**, a robotics company working with Sellafield.

Forth is developing a £500,000 six-legged machine about the size of a coffee table. The robot is packed with cameras and sensors to see its environment. A giant pincher on the front grabs contaminated material and breaks it up. Magnets on the machine's feet will enable it to crawl up walls.

Artificial intelligence software allows a team of the robots to work without humans at the controls, communicating with one another to complete a task. If one breaks down, others take over. "The robot will make its own decisions on how it walks, what it sees, and its interpretation of its environment," Telford says.

Forth has a working prototype, but says the finished product is 18 months away, will need to stay plugged in to a power source, and requires a human operator's OK for delicate tasks like moving a fuel rod. It's also unclear how it'll respond to long-term radiation exposure. Even for robots, Forth says, there's no coming back from some of the most dangerous areas.

Inside Sellafield's decaying waste ponds, robots from other manufacturers scoop up sludge and other debris and drop it into steel containers later placed in silos. "That little machine has removed thousands of items," says drone operator Keith Ashbridge.

The robots are giving officials

a look inside contaminated areas that have long been abandoned. **Createc**, another startup working with Sellafield, has developed a quadcopter drone nimble enough to fly in the office kitchen, or through holes made by the 1957 reactor fire. It's loaded with cameras, air-pressure sensors, gyrometers, accelerometers, and other measuring tools that stream back 3D maps locating the radioactive material. Officials in Japan have hired Createc to build maps for the Fukushima cleanup.

Those who've worked on decommissioning Sellafield say technology isn't a magic bullet. The 70-year-old site—home to 10,000 employees and its own rail service and police and fire departments—looks its age and will eventually cost at least £90 billion to properly clean up, says Paul Dorfman, honorary senior researcher at the Energy Institute at University College London. And even as robots work to scrub Sellafield's most dangerous areas, more waste continues to arrive from elsewhere in the U.K., Europe, and Japan. All told, Sellafield houses one of the largest stockpiles of plutonium in the world and receives about £800 million a year to reprocess and manage spent nuclear fuel.

Dorfman says Sellafield's problems reflect how the expense and danger of dealing with nuclear waste are often hugely underestimated. The government's estimated cost to clean up Sellafield has almost doubled over the past decade. With renewable power becoming cheaper, Dorfman says the carbon-free benefit of nuclear power isn't worth the risk. "You have to understand the depth of the problem," he says. Nuclear waste remains radioactive for thousands of years, and the government still doesn't have a long-term place to store it, even if robots can clean it up effectively. The U.S., France, Germany, and Japan face similar storage challenges.

Even if every nuclear power plant in the world were shut down tomorrow, it would take a century or more to deal with the waste, and that task will increasingly fall to machines. With powerful computers being squeezed onto smaller chassis, robots in the next decade will acquire better decision-making skills, giving them the ability to improvise within unpredictable

environments, says Paul Mort, who leads Sellafield's robotics and autonomous systems development. "It's not that far away," he says. In an era when people are concerned about job-snatching robots, Mort says, this is one task humans will gladly cede to machines. —Adam Satariano

The bottom line Europe's biggest nuclear waste dump is a proving ground for increasingly self-sufficient drones, which are working to clean it up.

Machine Learning

AI Speed-Reading For the Masses



▶ **Startup Gamalon gives image-recognition bots a head start**

▶ **"The promise here is that you use data a lot more efficiently"**

In 2012, **Google** researchers found a whimsical way to show off the power of the company's artificial intelligence technology: They trained computers to recognize cats in YouTube videos. The project took years to pull off and required 16,000 computer processors to analyze 10 million images. That type of AI, known as deep learning, now powers **Amazon.com**'s smart speaker Echo and **Tesla**'s self-driving cars. While such software can seem magical, it still typically requires thousands of computers to spend months scanning millions of data points.

Ben Vigoda, an MIT-trained computer scientist (and nephew of late actor Abe Vigoda), says he can cut out most of the grunt work and make AI projects doable for businesses without Google-level resources. His company, **Gamalon Machine Intelligence**, uses probability models to teach a computer to ID something like a cat in a few minutes by showing it just a few images. "You can run our software on a laptop, and it

takes 100 times less horsepower to find an answer," says Vigoda, who started Gamalon in 2013 but is showing its products to the public for the first time.

A typical deep-learning system needs to see tons of cats to learn all their variations—cats with every length of legs, whiskers, and so on. Gamalon's system gets a head start on this process with a new form of what's known as probabilistic programming. Shown a cat with a long tail and another with a short one, it can fill in the gaps. "The promise here is that you use data a lot more efficiently," says Brenden Lake, a data science fellow at New York University.

Vigoda's previous business, Lyric Semiconductor, hard-wired probability functions into computer chips. Lyric's tech has found its way into Echo and cars, where it helps guess what people are saying, and into smartphones, where it improves the results of touches and swipes. With \$4.5 million in funding from Silicon Valley investors and backing from the Defense Advanced Research Projects Agency, the Pentagon's research and development arm, the Gamalon team has spent the past few years advancing probability technology to broaden its usefulness.

Academics have been working on probability-based AI systems for more than a decade, but few have made it to the real world. **Microsoft**'s TrueSkill, which ranks Xbox gamers, uses similar technology, as does pioneering startup Geometric Intelligence, acquired last year by **Uber**. Such systems have been tough to expand beyond very specific uses because humans still have to do the complex, time-consuming math to adjust their probability models. Gamalon's big claim is that its software can adjust its own models, essentially reprogramming itself.

While Vigoda says his technology can be applied broadly, his company has started by focusing on a niche. Its first products, called Structure and Match, are designed to scour common databases and fix ambiguities, like different spellings for customer names and addresses. Communications-hardware maker **Avaya**, one of Gamalon's handful of early customers, has been using the software—which costs \$10,000 a month for analysis of each 100,000 rows of text in a database—for this kind of task.

Thousands of companies resell Avaya's products and record customer

data in different ways. To keep its databases effectively searchable, Avaya used to use people to pore through them for months at a time, turning "St." into "Street" or "HP" into "Hewlett-Packard." "With Gamalon, we were able to match 85 percent of the data in minutes instead of days," says senior director Cary Gumbert. Unlike find-and-replace search tools, the software can recognize context, so it doesn't turn, say, the "St." in "St. Louis" into "Street." "If we train it more and tell it where it has missed something," Gumbert says, "it will only get better." —Ashlee Vance

The bottom line Gamalon says it can cut AI training requirements from millions of photos and thousands of computers down to a few of each.

E-Commerce

Why You Need the Internet to Drill

▶ **Website EnergyNet is the leading hub for federal land leases**

▶ **"We have a lot of protesters. You can't be too careful these days"**

The Obama administration largely put an end to old-school federal energy auctions last year, just when they were starting to get interesting.

Those barker-and-gavel sessions, long the primary way the Bureau of Land Management sold leasing rights for oil and gas drilling on federal property, had become targets for climate activists. A year ago, a conservationist worried about drilling near her home in Utah paid \$2,500 for the rights to 1,120 acres of federal land. (She put the purchase on a credit card.) The BLM rescinded the lease months later after she'd made it clear she didn't intend to drill.

The bigger disruption came in May, when hundreds of protesters blockaded a 7,000-acre auction at a Holiday Inn in Lakewood, Colo. Police eventually broke the blockade, and Kathleen Sgamma, president of Western Energy Alliance, a powerful industry lobbying group, told a local newspaper she'd ask the BLM "to get rid of this circus by just holding online auctions."

Over the summer, the BLM changed its rules to do just that, and this year ▶

◀ only two of its 26 auctions will be held in person. The rest have been contracted to **EnergyNet**, a privately held company in Amarillo, Texas, that runs the country's largest auction site for oil and gas properties. Obama's BLM gave EnergyNet a five-year exclusive to manage the bureau's online auctions, and the company has since

2

The number of federal energy-lease auctions to be held in person this year, out of a total of 26

made similar deals with state agencies in Colorado, New Mexico, North Dakota, Texas, Utah, and Wyoming.

EnergyNet takes a 1.5 percent commission on its BLM auctions, and sales of federal and state

lands on the site topped \$158 million last year. Overall sales on the platform rose to \$745 million, more than triple the 2013 figure. Partly, that's because cratering oil prices have pushed leaseholders to put their rights up for sale.

EnergyNet auctions naturally filter out most protesters. Under the terms listed on the website, registered lessees must be able to prove that they're professionals "engaged in the oil or gas or other minerals business on an ongoing basis." Still, Chief Executive Officer William Britain is clearly worried about activists. He responded to an interview request by asking that a *Bloomberg Businessweek* editor call to confirm the reporter's identity. "With the government work we are doing, we have a lot of protesters," Britain says. "You can't be too careful these days."

Britain, previously an oil and gas driller, founded EnergyNet in 1999 and started pitching the site to the BLM in 2009. At the time, a Reagan-era federal mandate required that all auctions be conducted in person and relatively near the land being auctioned, so "we went to work trying to get that law changed," he says. Eventually, the company helped get language giving the BLM power to shift its auctions online tucked into the 2015 National Defense Authorization Act, the annual Pentagon budget. "Everyone should want it to be easier to buy federal leases," Britain says, "rather than just these little regional live auctions they'd been having."

Anti-drilling activists say the result

is opacity, not efficiency. "The real effort here is to take auctions out of the public spotlight and to scurry into the cover of darkness to escape people who want to protest," says Jason Schwartz, a spokesman for Greenpeace, which helped organize the Lakewood protest.

Then again, the old auction process wasn't exactly transparent, either, says Nada Culver, director of the BLM policy group at the Wilderness Society, another conservation advocate. "The guy in the cowboy hat and the boots at the auction is not the giant oil and gas company that ends up with the lease," she says. "This is not a process that's ever been open to regular people."

—Mya Frazier

The bottom line Sales on EnergyNet more than tripled in three years, reaching \$745 million in 2016, including \$158 million in government lands.

Implants

Do-It-Yourself Transhumanism

▶ **A \$425 sensor-implant kit goes a step beyond wearable gadgets**

▶ **"What I did before I started this was no less crazy"**

"What's that thing sticking out of your head?" a woman asks the man with a serpentine antenna between his eyes.

Neil Harbisson turns, parts his bowl-cut blond locks, and curves the antenna toward the buttinsky. "It's a way to hear color," he says.

"What's it connected to?" she asks.

Harbisson looks up at her with smiling, cobalt eyes. "My brain."

At an outdoor cafe at L.A.'s Original Farmers Market, passersby are constantly checking out Harbisson, 34, and his partner, Moon Ribas, 31. In her left arm, she has a Bluetooth implant designed to analyze the earth's seismic movements. What's it feel like? "Two heartbeats," she says.

Harbisson, whose U.K. passport shows he's the first legally recognized cyborg, was born colorblind. He designed his antenna—which translates

colors into one of 360 musical tones he's memorized—back in 2003 with help from a cyberneticist. At first, he connected it to headphones and a laptop. Eventually, he persuaded a surgeon to drill into his skull, implant a chip, and fuse the antenna to his occipital bone.

The couple say merging technology with their bodies has created new senses. "We are transspecies," says Ribas, whose three-year-old seismic implant vibrates at different intensities based on data from online seismographs. As with other biohackers, their claims—he says my color registers as an F sharp, for example—are difficult to verify. But their London startup, **Cyborg Nest**, is manufacturing DIY kits meant to bring their transhumanism closer to the mainstream.

The first kit, the North Sense, is essentially a \$425 wearable implant. "It does one simple thing," says co-founder and Chief Executive Officer Liviu Babitz, who was fitted with one in December. "A short vibration every time you're facing north." That doesn't sound like an advantage worth body modification, but Babitz likens the experience to a second childhood. "I remember my son discovering things as his senses developed and the look in his eyes when it happened," he says. "I feel the same."

The sensor itself, a compass chip that detects magnetic fields, is easy to remove. The tough part is installing two pocket-size titanium barbells into the wearer's chest, like a piercing. When the skin heals, typically after a month or two, the silicone-coated



CEO Babitz was fitted with one in December and compares the experience to a second childhood

Innovation

Needle Camera

Form and function

The Mi-eye2 is a wide-angle camera in a disposable needle with a USB-connected tablet meant to diagnose joint injuries without an MRI.

Innovator Jeffrey O'Donnell Sr.

Age 56

Chief executive officer of Trice Medical, a 35-employee startup in King of Prussia, Pa.



1.
Insert After numbing a patient's knee, shoulder, or other joint, a surgeon inserts the 0.09-inch Mi-eye2 needle.

Origin O'Donnell founded Trice Medical in 2011 with his son, Jeffrey Jr., and engineer Richard Washburn. He'd been a managing partner at BioStar Ventures, an early investor.

Funding Trice has raised about \$22 million for Mi-eye2, its only product, from venture capital firms and individual investors.



Customers The FDA-cleared Mi-eye2 is meant for orthopedic surgeons. The imaging system sells for \$495, and the tablet rents for \$250 a month.

Rivals Competing in-office orthoscopic systems are bulkier, with thicker, nondisposable needles and bigger processors, and typically display only a 75-degree field of view.



View Video from the camera shows a 120-degree view of the interior of the joint on the tablet, allowing the surgeon to spot tears and other injuries.

Next Steps

Trice plans to launch Mi-eye2 internationally in the second half of 2017. Nirav Amin, an orthopedic surgeon and professor of sports medicine and knee reconstruction at Loma Linda University Medical in Loma Linda, Calif., says the device's size puts his patients at ease and the disposable needles reduce infection risk. "It's a fantastic new product," he says. —Michael Belfiore

North Sense slides onto the implant. Babitz says the sensor is designed to allow the free flow of air and avoid skin irritation, and it's waterproof. It's certainly nowhere near as conspicuous as Harbisson's antenna, though it goes a step beyond less invasive wearable devices, such as the ankle kit from startup **North Paw** that also vibrates when facing magnetic north.

Cyborg Nest, launched in 2015 with about \$200,000 in pooled funds, began shipping North Senses in February. The company says about 1,000 people have ordered one. (Babitz verifies their identities to make sure they're adults.) The Romanian, who used to work for the human-rights group Videre Est Credere getting cameras and other technology to oppressed communities to expose government abuses, admits his wife and friends have been skeptical. Then again, he says, laughing, "What I did before I started this was no less crazy."

Stanford genetics department chairman Michael Snyder says these implants aren't as fringe as they sound, noting that he employs similar medical sensors to detect colds, Lyme disease, and diabetes risk. He calls the North Sense "analogous to the radiation monitor that I use." The World Economic Forum says Cyborg Nest's type of biohacking could be commonplace by 2020. "If you're alive today, you're probably going to end up having at least one electronic attachment," Babitz says.

Journalist Mark O'Connell, who wrote *To Be a Machine*, a book about the transhumanist movement, isn't convinced that the niche use for the North Sense will appeal to a mass audience. "I don't see it taking it off," he says. "Then again, tattoos are everywhere now."

Babitz declined to discuss Cyborg Nest's next projects, but Harbisson and Ribas have a wish list: a Bluetooth tooth for silent communication; a way to detect pollution; eyes in the back of the head. The big question, Harbisson says, is how to adjust a person's mental perspective to accept those kinds of inputs. "The body isn't the focus," he says. "Modifying our minds is what really changed us." —Adam Popescu

The bottom line Cyborg Nest has sold about 1,000 DIY implants that vibrate when a wearer faces north, retraining their sensory comprehension.

February 20 — March 5, 2017



► More drivers on the road + costly parts + texting = bigger claims

► “That premiums are rising becomes a real impediment to families’ finances”

When **Travelers** said in January that it was ready to increase prices for car insurance, Wall Street’s attitude was: “What took you so long?” Consumers may soon be wondering when the premium hikes will ever end.

The largest U.S. auto insurers have suffered from years of higher-than-expected claims, frustrating investors. Industrywide, companies have been paying \$1.05 in costs for every \$1 in premium revenue. A decade ago that figure was 95¢—meaning insurers came out a nickel ahead. **Allstate** and Berkshire Hathaway’s **Geico** unit have

been raising prices since at least 2015, making Travelers one of the last big shoes to drop.

At an investor conference last year, Tom Wilson, Allstate’s chief executive officer, said rising costs were partly the result of the economy’s expansion. More people commuting to work—and driving to vacations—means more cars on the road and more accidents. Then there’s distracted driving: Allstate said in February there’s a “striking” correlation between the rise in smartphone use and crashes. All told, vehicle-related deaths rose 8 percent in the

first nine months of 2016 from the same period in 2015.

Because of increased health-care costs, claims are costlier when accidents happen. And car features that are meant to minimize accidents, such as driver-assistance technology and cameras on the bumper, can add to repair bills. “Where a normal repair 10 or 15 years ago from an accident cost \$1,500, now that same bumper with all the technology is \$3,500,” says Derek Ross, president of Kulchin Ross Insurance Services, an insurance brokerage based in Tarzana, Calif. “The



insurance companies are absorbing those real dollar claims while trying to figure out how much of this automation and technology is actually working to their benefit.”

The pace of premium increases has hit a 13-year high, according to data from the U.S. Department of Labor’s consumer price index. A number of state regulators say they’re concerned about the higher costs for drivers. California’s insurance commissioner created a low-cost insurance program last year for lower-income residents and pushed companies to explain why their costs are so high.

A January report from the U.S. Department of the Treasury says more than 18 million Americans live in a ZIP code where car insurance is unaffordable based on the median local income. “For the most part around this country, you need a car to be economically mobile,” says Doug Heller, an insurance expert at the Consumer Federation of America. “That premiums are rising becomes a real impediment to families’ finances and economic growth.”

Wall Street, on the other hand, has applauded the shift. “The industry needs to generate a reasonable rate of return,” says Barclays analyst Jay Gelb. Amit Kumar, an analyst at Macquarie Group, upgraded his recommendation on Travelers partly because of the decision to raise rates.

Still, just because insurers might like to collect higher premiums doesn’t mean consumers will sit still

for them. According to the **Zebra**, which compares quotes for more than 200 insurance companies, premiums are \$1,323 a year for a male with a good driving record, up from \$1,194 in 2011. That’s a noticeable bill in the family budget. So there’s an incentive to shop around and change insurers.

It’s getting easier to do. Startups and venture capital investors are racing into the online insurance-shopping business. Mark Cuban is among investors backing the Zebra. **CoverHound**, which previously helped Google create a comparison website before it was closed last year, has raised more than \$50 million for its own similar effort. “We are seeing more customers switch now on our site than ever before,” says Andrew Rose, the CEO of **Compare.com**, another company that helps customers find quotes online.

At the same time, startup insurers such as **Metromile** seek to provide cheaper options by allowing motorists to pay for coverage based on how much they drive. Customers put a wireless device in their car that measures mileage and shares it with the insurer.

Over the longer term, big insurers face deeper threats to their profitability. Morgan Stanley and Boston Consulting Group said in a recent report that the \$200 billion global business could shrink 80 percent by 2040. Ride sharing services such as Uber may lead more people to skip buying a car, or maybe that second family car. Self-driving

vehicles could reverse the rise in costly accidents but also force premiums lower. And the makers of navigation apps and connected cars, with direct access to a driver’s data, could emerge as competitors to traditional insurers.

“The watershed moment is sometime in the next decade,” says Rose of Compare.com. “When do you stop seeing rate increases and you start seeing rate decreases?” The companies that guess the next turn correctly—and move fast enough to cut rates and grab market share—will win the next cycle in the insurance business. —*Lisa Du and Sonali Basak*

The bottom line Big car insurers are raising premiums to return to profitability—but that’s made them vulnerable to new competitors.

Investing

The Master Chides His Students

► Warren Buffett says he thinks money managers charge too much

► “That’s got to sting, especially for Buffett fans”

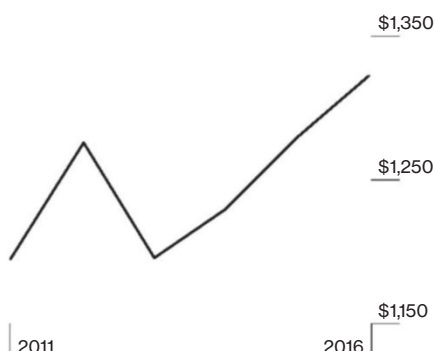
Frank Byrd was a 25-year-old stockbroker at Merrill Lynch in Memphis when he first read Warren Buffett’s annual letter to **Berkshire Hathaway** shareholders. He recalls thinking, “It’s the first thing that I read that I said, ‘This makes sense.’” Byrd had noticed that his clients who did the best in the market hardly ever traded; like Buffett, they bought stock in companies they admired and stashed it away for years. “I knew it wasn’t theory,” he says. “I knew it worked.” He later decided to study investing at Columbia Business School—Buffett’s alma mater—and then worked for 15 years in the hedge fund industry.

The billionaire investor has been on Byrd’s mind recently. Buffett

Michigan drivers must buy insurance that covers accidents regardless of fault, with no limit on personal injury coverage

The Cost of Auto Insurance

Average annual premium in the U.S.*



Most expensive states in 2016

| | |
|----------|---------|
| Michigan | \$2,087 |
| Delaware | \$2,073 |
| Oklahoma | \$1,990 |
| Kentucky | \$1,925 |
| Texas | \$1,762 |

Least expensive states

| | |
|----------------|-------|
| Ohio | \$764 |
| North Carolina | \$817 |
| Idaho | \$919 |
| Maine | \$937 |
| Iowa | \$971 |

The state’s insurance regulator sets a maximum rate

◀ inspired a generation of financial pros to believe beating the market was possible, but lately he's been lecturing about how money managers and investment consultants aren't, on the whole, worth their fees. He's become an outspoken booster of low-cost funds that passively track stock market indexes such as the S&P 500. Last October, Byrd was invited back to Columbia to give a talk on Buffett. The question at hand: "Why is our hero, Warren, steering people away from active managers?"

That question is sure to get more attention soon. Buffett's annual letter is coming out on Feb. 25, and he's promised to delve into the topic again. "I'm really eager to read it," says Paul Lountzis, a money manager who worked early in his career at Ruane, Cunniff & Goldfarb, a firm started by Buffett's friend Bill Ruane. "I don't think he means that everyone out there is trying to bilk the client," Lountzis says. "But it is frustrating when a client calls you and says, 'Warren said this.'"

Three decades ago, Buffett delivered an influential speech at Columbia called "The Superinvestors of Graham-and-Doddsville," describing the results of a small group of investors he knew, including Ruane. All had significantly outperformed the market by following the strategies laid out in a classic investing textbook by Benjamin Graham and David Dodd. Buffett's key message: Markets can be faddish and emotional, and intelligent investors can use that to their advantage. He hit on the theme for years in his annual letter.

In the letter three years ago, Buffett struck a far different note. He said most of the money he was leaving for his wife after his death was going to be invested in an S&P 500 tracker like **Vanguard's** 500 Index Fund. "I believe the trust's long-term results

from this policy will be superior to those attained by most investors—whether pension funds, institutions, or individuals—who employ high-fee managers," he wrote. Last April, at Berkshire's annual meeting in Omaha, he explained why: So many money managers and consultants charged exorbitant fees. The arrangements, he said, "eat up capital like crazy," so you'd be better off "sitting on your rear end" in an index fund.

The numbers back Buffett up. The Vanguard 500 Index has beaten about 70 percent of funds that buy the stock of large U.S. companies over the past 15 years, according to data from Morningstar. Hedge funds, too, have underperformed for years, and they're seeing clients yank money. Buffett himself is a glaring exception to the rule: The share price of Berkshire Hathaway, which holds his investments, gained

an annualized 20.8 percent from 1965 through 2015, according to the company, compared with 9.7 percent for the S&P 500.

"Here is the most lauded money manager of our times saying, 'Hey, the vast majority of you guys aren't worth your weight in fees,'" says David Rolfe, chief investment officer at **Wedgewood Partners**, a Berkshire investor that oversees \$7.2 billion. "That's got to sting, especially for Buffett fans."

Byrd says Buffett's attack on money management makes sense when you look at the numbers. Portfolio management and investment advice as a percentage of U.S. personal consumption has soared sixfold since the 1980s, when Buffett became a household name. Such fees are a "sinfully high tax" on investors, Byrd says, and must make Buffett mad, given his role in ushering in the boom.

During his years co-managing a hedge fund, Byrd says he rarely had

conversations with clients about fees. He's now working in a different corner of the investing world. Since 2015 his firm, **Felder Capital Group**, has been managing money for individuals, focusing on financial planning rather than stockpicking. Clients typically pay 0.49 percent to 0.89 percent of assets under management, far less than the 1.5 percent plus a bonus of 20 percent of profits Byrd charged at the hedge fund. He says his clients are primarily invested in index funds, because they're inexpensive.

The planning business, too, is under pressure on fees, with so-called robo-advisers offering inexpensive automated portfolios. Byrd says some clients still want a bit of hand-holding and personal attention on the money front. Unlike beating the market, those are things a good planner can credibly promise to deliver. "We manage the lion's share, if not all, the liquid net worth of all our clients," Byrd says. "That's, ironically, a much bigger responsibility than I felt running a hedge fund." —Noah Buhayar

The bottom line Buffett convinced many investors that the market can be beaten, but he's a big fan of index funds. Awkward.

Trading

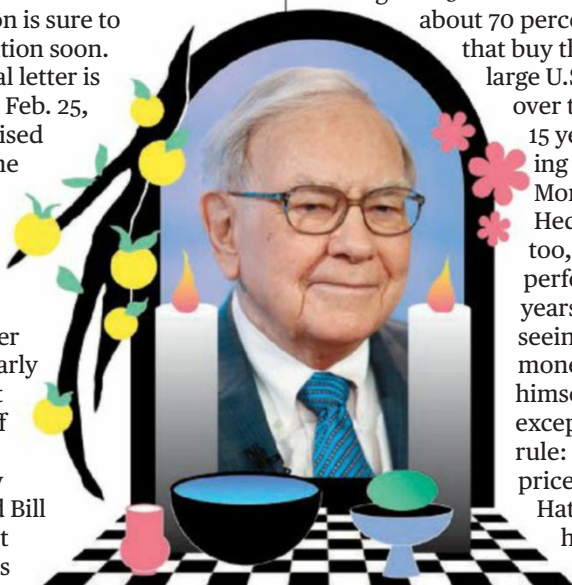
Dirty Deeds Hidden In a Mess of Data

▶ A market watchdog has more info than it can afford to sort through

▶ "We have a perfect forensic record of events"

At the cash-strapped regulator of the U.S. derivatives market, even an iPhone's worth of data is too much to handle. Every day, just a bit after 4 p.m., about 50 gigabytes of data are transmitted from the Chicago office of **CME Group** to the Commodity Futures Trading Commission in Washington. The files contain the day's history of trades on the world's largest futures exchange, which CME runs. And that's just a sliver of the information the agency gets.

One way to nail crooked traders who are distorting prices is to sift through



Digits

\$20t

More than \$1 trillion
is held by fund
giant Vanguard

Stocks are more
expensive relative to
company earnings
than they've been
since April 2002

Total market value of stocks in the **S&P 500 index** on Feb. 13, a record. That's about \$14 trillion more than they were worth on March 9, 2009, the market's low point during the financial crisis

that data and spot manipulation. Yet cases of potential fraud are likely going undetected, in part because the CFTC lacks sophisticated software to analyze the data it gets from CME and the other parts of the markets it oversees. "The CFTC has an enormous amount of data," says Aitan Goelman, who until February was director for enforcement at the commission. "We could be doing so much more to proactively detect misconduct, and we can't because of our budget."

The main role of the CFTC is to police the \$34 trillion U.S. futures market. After the financial crisis, which was caused in part by complex financial derivatives, the 2010 Dodd-Frank Act also gave the CFTC oversight of an even bigger market: the \$400 trillion in swaps traded outside of exchanges. While the commission has been asking for a budget equal to that new responsibility, Congress from 2011 to 2016 has given it on average \$72 million less per year than it requested.

Compared with the markets for stocks, those for futures and other derivatives are obscure to most individual investors. But corporations, farmers, manufacturers, and financial institutions all use them to manage the risks of their businesses, by betting on the future prices of everything from wheat and oil to stocks and bonds. If hedging doesn't work well, "it makes the entire system more risky," says Dan Berkovitz, a former general counsel for the CFTC who's now a partner at Wilmer Cutler Pickering Hale & Dorr.

With President Trump vowing to roll back financial rules and put regulatory agencies under a microscope, the watchdog could be further reined in. In January, House Republicans passed a bill that would allot \$250 million a year to the CFTC through 2021, 24 percent less than the \$330 million President Obama asked for in his last budget.

The agency has about 160 people working in enforcement—with just one overseeing trading in the \$117 billion U.S. oil market, where wholesale prices for gasoline and heating oil are set. By comparison, the U.S. Securities and Exchange Commission, which

watches the stock market, has an enforcement team of 1,400. It receives \$1.8 billion, part of which is funded by fees levied on stock trades. The CFTC gets its money from Congress.

In January the CFTC secured a lifetime ban against former New Jersey Governor and U.S. Senator Jon Corzine for his role as chief executive officer in the 2011 failure of MF Global. And it played a central part alongside other federal regulators in bringing charges against the world's largest banks and brokers for rigging global foreign exchange and interest rate markets, including the benchmark for the rates on millions of home loans worldwide.

To sort through market data, the SEC has at its disposal the analytic power of **Palantir Technologies**, which is used by the departments

of Defense, Justice, and Homeland Security, as well as corporate and investing giants. The CFTC has long wanted the same but can't afford it, say people familiar with the agency.

Still, it's making inroads. Within the past year or so the enforcement division cut deals to work with private companies **Vertex Analytics** and **Neurensic**, according to a person familiar with the matter. Vertex offers real-time visualization and pattern-recognition tools that can make it easier to spot illegal trading maneuvers such as spoofing—entering orders you don't mean to execute in order to manipulate prices. The company gets the same data the

CFTC receives from CME each day. "We have a perfect forensic record of events" and can scan "billions upon billions of data points within minutes," says Doug Duquette, Vertex's chief operating officer.

Neurensic uses artificial intelligence to sift through reams of raw data and even to discover new types of fraud, says CEO David Widerhorn. The technology can "find things that no one has even seen before that are manipulative," he says. This occurred recently with a new type of spoofing that people at Neurensic started to call vacuuming. "Our AI said, 'Wait a second, look at this pattern, it's basically the same thing, just more complicated,'" Widerhorn says.

Duquette and Widerhorn both declined to discuss the CFTC work, citing contractual obligations. While these are first steps for the CFTC, the people familiar with the agency say its only scratching the surface in its efforts to protect markets. In 2013 it said it declined to pursue cases against individuals involved in the \$6.2 billion "London Whale" trading loss at JPMorgan Chase, in part because of resource constraints. "There is an enormous amount of misconduct in our markets that goes unchecked and undetected," says Goelman, the former head of enforcement. —*Matthew Leising*

The bottom line The CFTC is turning to private companies to help it find signs of manipulation in the derivatives market.

B Edited by Pat Regnier
Bloomberg.com

"We could be doing so much more to proactively detect misconduct, and we can't because of our budget."
—*Aitan Goelman, former head of enforcement at the CFTC*

**I connect enterprises in the cloud.
My communications and collaboration
solution powers our innovation.**

Box knows workflows are moving faster than ever before, with professionals collaborating at a pace of incredible productivity. This realization not only inspires their cloud-based enterprise content management solution, it also inspires Box to work with a trusted communications and collaboration solutions partner, also born in the cloud. RingCentral empowers today's mobile and distributed workforces to be connected anywhere and on any device. With an open platform that integrates with today's leading business apps, RingCentral gives customers the flexibility to customize their own workflows. Knowledge is power, and organizations that connect effortlessly will share the brilliant ideas that build the innovations of tomorrow.

PAUL CHAPMAN
Chief Information Officer, box

ringcentral.com/heroes

February 20 — March 5, 2017

The Greatest Generation Is Around the Corner



- New 5G networks will connect cars, drones, and robots, without sacrificing speed
- “For consumers, it will mean gobs of capacity and create a truly unlimited data environment”

Today's cellular networks can guide you to a destination in an unknown city; tomorrow's will transport you there.

The wireless standard known as 4G has untethered us from our living rooms and offices, allowing us to navigate unfamiliar roads and streets using voice directions from Google Maps, stream movies on Netflix while commuting to work, and interview a prospective hire on FaceTime during a flight layover. The next iteration promises to be even more transformative, because it will support communication among objects, as well as people. In a report released in January, IHS Markit, a London-based research firm, says the arrival of 5G, sometime around 2020, will elevate wireless to an elite category economists call general purpose technologies that includes the printing press and the steam engine. The study estimates that 5G will generate \$3.5 trillion in economic output and 22 million jobs worldwide by 2035.

When **Verizon Wireless** rolled out 4G service in the U.S. in 2011, the term “mobile device” described handsets, tablets, and laptops. Cisco Systems estimates that by 2021 there will be 12 billion connected devices globally and approximately one-quarter of them will be cars, aerial drones, industrial robots, and other types of machines.

The leap will require giant increases in network capacity and data transmission speeds. Today, 4G speeds in

the U.S. typically max out at about 1 gigabit per second under ideal conditions; 5G will dial that up to 10 gigabits per second. You'll be able to download a high-definition movie in less than a second, a task that takes several minutes nowadays. “For consumers, it will mean gobs of capacity and create a truly unlimited data environment,” says Roger Entner, the founder of Recon Analytics.

Perhaps the biggest advance will be a vast reduction in latency—that is, communication lag times. Low latency is more or less a prerequisite for the commercialization of a slew of new technologies, including driverless cars, which need to ping one another multiple times per second to avoid collisions, as well as telesurgery and robotics. To shorten delays, 5G networks will have built-in processing power, store data closer to where it's needed, and run on a new swath of radio-frequency spectrum.

The changeover won't happen with the flip of a switch. An umbrella group of standard-setting agencies, 3GPP, is supposed to publish a set of draft specifications by late 2019. The U.S. and South Korea will probably launch prestandard 5G networks sooner than that. “We are moving out of PowerPoint presentations to products,” says Michael Murphy, chief technology officer for North America at telecom equipment vendor Nokia, who predicts there'll

be what he calls “precommercial” deployments by the end of this year.

This summer, **AT&T** and Verizon will each begin trials in select cities using 5G to beam movies and TV channels into homes wirelessly, competing with cable and satellite TV operators head-on. Australia and South Korea will demo their own 5G networks next year, the latter during the Winter Olympics. But the bulk of deployments will start in 2020, with carriers prioritizing cities.

In the transition, carriers, equipment makers, and others will invest a cumulative \$200 billion a year, according to IHS estimates. Some operators will be tempted to tag features onto 4G networks and slap on a new label, which will create confusion for consumers, says Tim Farrar, an analyst with researcher Telecom, Media & Finance Associates: “Operators will be incentivized to use 5G as a marketing term rather than being technically correct.”

Germany's luxury automakers announced in September that they were teaming up with **Ericsson**, **Huawei Technologies**, **Intel**, **Nokia**, and **Qualcomm** to form the 5G Automotive Association, whose mission is to help set standards and define uses for next-gen networks. **Daimler**, one of the association's founding members, envisions a future in which its car-sharing subsidiary, Car2go, could dispatch a driverless vehicle to pick up a customer at her

Brought to
you by 5G



Driverless cars
will talk to other cars, traffic lights, and infrastructure, exchanging data on speed, road conditions, and traffic patterns.



Drones will be able to relay the video-and-mapping data they record in real time.

Sports Fans watching a game on their phones will be able to alternate between video feeds from different cameras and cue instant replays.



◀ home. “Connectivity is important, and we are looking forward to getting more and more information into the cars,” says Bernhard Weidemann, a spokesman for Daimler. He cautions that a network delivering consistently good coverage as you travel from one city to another “is unlikely to come into being for a long time.”

In Aachen, Germany, Ericsson is testing 5G at a prototype factory where robots work at lightning speed. “You need a very fast control loop in order for the feedback of how the robot moves to be processed,” says Hakan Andersson, director of 5G strategy.

The fast-growing drone industry is also eagerly awaiting the advent of 5G. Most unmanned craft store video-and-mapping data from their flights onboard, then download it after landing. With 5G, drones will be able to beam high-definition video while in flight. That would allow fire departments, for instance, to dispatch a drone to the scene of a blaze to gauge the situation. “We are moving from a world where there’s thousands

of aircraft with sensors on them to a world where there are millions of aircraft with data on them,” says David Yoel, chief executive officer of drone maker American Aerospace Technologies.

“And that data needs to be transmitted in real time or near real time.”

For wireless carriers, many of which have seen annual revenue growth dip into the single digits, 5G can’t come soon enough. “We have a tough market in Europe, and we really want to change the game,” says Arnaud Vamparys, a senior vice president at France’s **Orange**, which is gearing up for a 2020 deployment.

Given the huge investments Orange and its peers will have to make to upgrade their networks, there are

bound to be clashes over access. Wireless operators have been powerless to stop services such as Netflix and YouTube from building profitable businesses atop their infrastructure. Will they stand by as makers of driverless cars and drones do the same, or will they press for a cut of the revenue? No doubt, governments and consumer groups will weigh in with their own proposals. Stay tuned for the tussle.

—Olga Kharif and Scott Moritz

The bottom line The next-generation mobile standard will support \$3.5 trillion in economic output by 2035, according to forecasts.

Retail

Mirror, Mirror, You’re the Smartest of Them All

▶ **Oak Labs aims to do away with fitting-room pain**

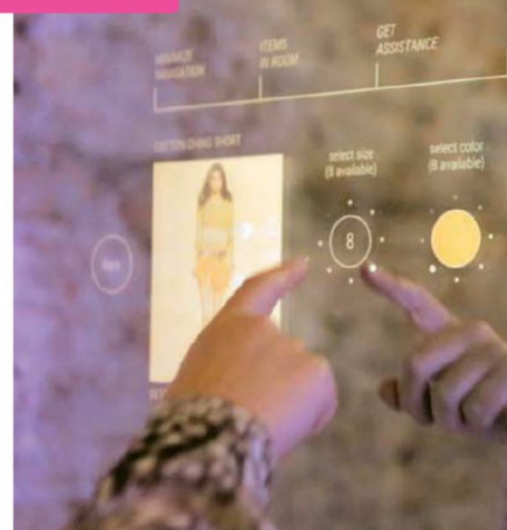
▶ **“You can really learn some truths other than what’s sold”**

Since e-commerce began threatening stores last decade, retailers have been trying to make their locations operate more like the web. Yet despite splurging on the latest bells and whistles, they’ve mostly failed and fallen further behind their online rivals.

Recent efforts—such as QR codes, which call up merchandise information when scanned with a smartphone, and internet kiosks, where shoppers can browse a retailer’s online store—are either too far ahead of, or behind, shoppers technologically, so they haven’t been embraced, says Brendan Witcher, an expert on retail strategies at Forrester. Plus they do little to improve the actual shopping experience, he says. “If you just deliver tech for tech’s stake, people will test the novelty of it, but it won’t stick.”

Oak Labs, a startup founded in 2015 by former EBay executives,

Oak Labs’ mirror



is focused on fixing what’s wrong with brick-and-mortar retailing. The San Francisco-based company started with the dressing room, which seemed as good a place as any given that shoppers have long complained about its lines, lackluster service, and bad lighting. What happens inside those few square feet of real estate matters—a lot, in fact: Shoppers who use fitting rooms are almost seven times more likely to make a purchase than those who simply browse the sales floor, according to research by Alert Tech.

Oak Labs’ first product is a dressing-room mirror that can offer an experience like this: A woman enters with jeans and a blouse. Sensors read the radio-frequency ID tags on the clothes and display the items on a touch-screen embedded behind the glass. A recommendation engine—like those ubiquitous online ones—suggests complementary pieces such as shoes and a belt. The customer can choose a language other than English and adjust the lighting (options might include “dusk” and “club”). If an item doesn’t fit or the color isn’t right, she taps the mirror, which triggers a request on store clerks’ mobile devices. The technology isn’t designed to replace

Telemedicine A surgeon will be able to operate on a patient remotely using a robot.

Retail Your fridge will alert the grocery store when you’re out of milk. New supplies will be delivered by unmanned vans or drones.



Augmented reality Ads, maps, and video will be projected onto shop windows, windshields, and eyeglasses.



Cable cutting

Who needs broadband when HD movies can be wirelessly streamed onto TVs?

Gaming Get ready for the marriage of massive multiplayer games and virtual reality.





salespeople, says Healey Cypher, Oak's chief executive officer and a co-founder: "We want to make their jobs easier, make them more effective."

Retailers can buy one of Oak's mirrors for \$25,000 (the price falls for larger orders) and pay a monthly licensing fee for the software. Or they can sign a five-year contract and pay \$7,000 to \$9,000 a year. The mirrors are being tested by a handful of upscale retailers, including Ralph Lauren and Rebecca Minkoff. Early results show that people buy more while spending less time in the dressing room, Cypher says.

Those stats may improve as the company rolls out a feature in coming weeks that allows shoppers to wave their phones in front of the mirror and make a purchase using Apple Pay or Android Pay. If an item isn't available, a customer can access the retailer's website with a few taps of the mirror, purchase it, and have it delivered. "There is that shopper who wants a private, anonymous experience of self-service," says Rebecca Minkoff co-founder and CEO Uri Minkoff. "That's the e-commerce experience. Why not carry that into the store?"

This type of technology could help stores catch up to data-rich e-commerce. Rebecca Minkoff, which has Oak's mirror at two of its shops, learned that a leather jacket was tried on 70 times in a week but never purchased. Half the shoppers asked for a different size using the touchscreen,

meaning there was a fit issue. "You can really learn some truths other than what's sold," says Uri, who, along with his sister, has a small stake in Oak Labs and advises the company.

Even with the promise of new data and a sales boost, the likelihood of a product such as this going mainstream remains an open question, says Forrester's Witcher. **Amazon.com** made a splash last year with plans for a store that eliminates checkout altogether, but the e-commerce giant has money to burn.

At the Rebecca Minkoff store in downtown Manhattan, sales associate Mercedes Yasmien says the mirror has been a big advantage. Introverts love that they aren't bothered, and extroverts love showing off the mirror to the point that they'll have "Snapchat parties" in there, she says. And the language options are a big help when tourists visit the store. On a block that includes luxury titans Louis Vuitton and Fendi, "it's nice to have something that sets us apart," she says.

—Matt Townsend

The bottom line Oak Labs' dressing-room mirror lets shoppers summon a sales associate and will soon allow them to pay with the tap of a screen.

Marketing

Snap Has a Different Angle on Mobile Ads

▶ **Marketers are starting to heed its appeal to go vertical**

▶ **"As soon as Instagram gets involved, it's a bigger audience"**

Snapchat has spent the past couple of years trying to persuade advertisers to abandon their training and instincts and shoot video promotions in a way that mobile phone users will watch full-screen—vertically, that is. Its pitch: Portrait ads on Snapchat get twice as much visual attention as landscape ones, because viewers don't have to rotate their screens.

It hasn't been an easy sell, though. Artistic principles aside, simultaneously shooting a vertical video and

a conventional one may require an additional camera plus a reconfigured set, to say nothing of a concept that works in Snapchat's 10-second slot, as opposed to the standard 30-second TV spot. While a lot of big brands have tried it—including Amazon, Pepsi, and Marriott—vertical hasn't gone mainstream. That may be about to change.

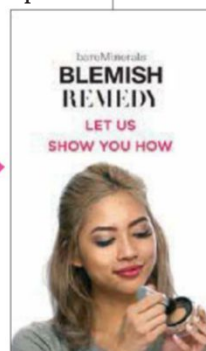
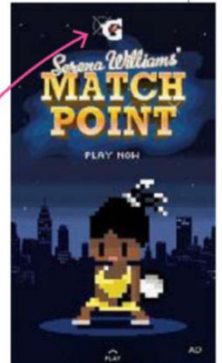
In August, **Instagram** introduced its own version of Snapchat's signature Stories feature, which lets users post videos that disappear after 24 hours. "As soon as Instagram gets involved, it's a bigger audience, a bit more global, and vertical video becomes relevant and pressing," says Dom Poynter, head of communications strategy at Barton F. Graf creative agency, which works with brands such as Supercell, maker of the *Clash of Clans* mobile game, and Bulleit bourbon. Poynter says he could suddenly justify slotting vertical into client plans and budgets, driven by the promise of reaching both Snapchat's 158 million daily users and Instagram's 400 million. Snapchat parent Snap is in a silent period in the runup to an initial public offering in March.

Kenny Mitchell, head of consumer engagement at PepsiCo's **Gatorade**, thinks vertical video is about to get much more prominent. "We contemplate it from the outset" during the planning for an ad campaign, he says.

Instagram began placing ads in its Snapchat copycat feature, also called Stories, in January. Its parent, **Facebook**, is testing a stories feature on its main app as well, which would potentially allow advertisers to reach its 1.8 billion users with the same single ad.

Los Angeles-based Snap touts its ability to command the attention of the coveted 18-to-34-year-old demographic. The company says it reaches 41 percent

of that group in the U.S. on any given day and that its audience is less likely to skip over ads because they're embedded in content generated by friends. But in a survey by Fluent, a data marketing company, 69 percent of Snapchat users said they always or often



◀ skip the ads. Worse, 62 percent said they expect an alternative to Snapchat to come out and that they'd switch to it.

Snap may be moving on to new things, too. Its \$130 Spectacles glasses sport a wide-angle camera to capture video that can be viewed vertically and horizontally. —Sarah Frier

The bottom line Companies are more receptive to Snapchat's appeal to make vertical ads now that Instagram is running them, too.

Entertainment

Where YouTube Meets The Boob Tube

▶ European broadcasters target phones as traditional ads stall

▶ An effort to "bridge the gap between mobile and TV"

Since its founding in 1983, French pay-TV provider **Canal Plus Group** has become one of Europe's top backers of films and television series, co-producing blockbusters such as *Bridget Jones's Diary* and hourlong shows like *The Young Pope*. Lately, Canal Plus has started emphasizing an entirely new format: serialized comedies and dramas delivered in 5- to 10-minute segments.

The company has set up a new unit, Studio+, which last fall released its first batch of series in Europe and Latin America, aimed at people who watch on their phones. It costs €4.99 a month to access the entire catalog, which ranges from Brazilian thriller *Crime Time—Hora de Perigo* to U.S. skateboard romance *Joy*. Studio+ seeks to release a series a week, spending about €1 million (\$1.1 million) on each "season" of about 10 episodes. Canal Plus parent Vivendi has signed distribution deals with carriers across Europe. "TV channels have digitalized their shows but not their revenues," says Dominique Delpont, who heads Vivendi's content business. "Broadcasters need to widen their scope."

Canal Plus joins other European networks faced with stagnating ad sales and growing competition for viewers from the likes of **Netflix** and

Amazon.com. To fight back, they're tailoring shows for a younger audience accustomed to viewing on the go. European broadcasters seek to "bridge the gap between mobile and TV," says Jérôme Bodin, an analyst at Natixis.

While major U.S. networks such as Viacom's **Comedy Central** and Comcast's **NBC** post shows—original and recycled—on **YouTube**, **Snapchat**, and **Facebook**, they're not putting a lot of energy into short-form for mobile because the financial rewards remain small. YouTube collects billions of dollars in ad sales each year, but traditional media companies get a relatively small share of that. A similar dynamic exists on Snapchat, which in 2016 generated \$404 million in revenue, of which media companies got \$58 million. And while Netflix can be watched on the go, its company execs expect subscribers to stream mainly in the living room.

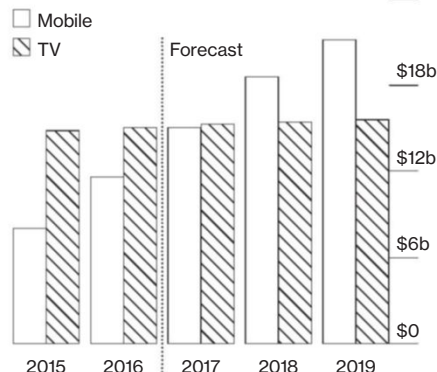
Ad spending on phone screens still lags TV in most of Europe, but it's catching up fast. Advertising sales for mobile in France, Germany, and the U.K. will reach \$21.2 billion in 2019, an 82 percent increase from last year's \$11.6 billion, researcher EMarketer predicts. During the same period, TV ad sales will rise just 3.6 percent, to \$15.6 billion. In Germany, one of Europe's healthiest TV markets, people spent more than twice as much time watching TV as they did looking at smartphones in 2015. Yet TV time will hover at about 220 minutes daily until 2019, while mobile will increase by a third, to 142 minutes, according to EMarketer. "Combining strong TV brands with mobile helps us create further growth," says Christof Wahl, chief operating officer at German broadcaster **ProSiebenSat.1**.

Traditional broadcasters can still find huge audiences—and lucrative ad deals—with soccer mega-events such as the UEFA Champions League and the World Cup. Prices for those matches, though, have skyrocketed. Rights for Britain's Premier League soccer have almost tripled, to £1.7 billion (\$2.1 billion) a year, since the start of the decade.

Some broadcasters have found a lower-cost alternative in online networks that bring together YouTube channels featuring clips on everything from yoga to computer gaming

Screen Battle

Mobile and TV ad spending in France, Germany, and the U.K.



DATA: EMARKETER

and cooking to basketball shots. Bertelsmann's **RTL Group**, which has interests in about 60 channels across Europe and Asia, bought 51 percent of a web video network called **BroadbandTV** in 2013. A year later it invested in **SpotX**, which specializes in selling online and mobile video ads. RTL's combined digital video views jumped to 105 billion in 2015, six times their level two years earlier. The group has since financed short-form shows made specifically for young mobile audiences, including *Continuum*, an online music project started in December in which musicians from four countries perform together virtually on YouTube.

ProSiebenSat.1, Italy's **Mediaset**, and France's **TF1** agreed in January to jointly push their web video efforts, creating scale to better negotiate with big advertisers. The alliance's prime asset, Studio71, racks up 6 billion video views a month with stars ranging from Hollywood big shots such as Dwayne "The Rock" Johnson to LeFloid, a tattooed 29-year-old German who became the first YouTuber to interview Chancellor Angela Merkel. "Mobile is complementary to traditional TV," says Régis Ravanis, executive vice president for advertising and diversification at TF1. "It's a way of reaching another type of viewer." —Stefan Nicola and Alexandre Boksenbaum-Granier, with Lucas Shaw

The bottom line As traditional TV ad sales stagnate, European broadcasters are creating short-form series for mobile viewers.

NO MORE AWKWARD HUGS WITH TED FROM ACCOUNTING.



Instead of “retreating,” charge your team toward innovation and ignite their teamwork. Find out why companies and organizations like Google, Fidelity, Red Bull and Harvard Business School all work with IA Innovation.

iainnovation.com

INNOVATION
AN IMPROV ASYLUM COMPANY

'Bill and I are impatient optimists'

46

Melinda Gates talks with

Bloomberg Businessweek Editor Megan Murphy

about the foundation she
runs with her husband

Photographs by Victoria Hely-Hutchinson





This year's annual letter from the Gates Foundation takes a slightly different format: It's written to Warren Buffett, who 10 years ago pledged \$30 billion to the foundation.

Warren's really inspired us. For years he's written an annual letter for Berkshire Hathaway to talk to the shareholders about how he's thinking about the business. Given that it's the 10-year anniversary of his gift, we thought, let's use that as a marker to really spend some time, Bill and I, reflecting on what we have accomplished, as if we're trying to tell him what his return on investment has been. It ended up being a really good exercise for both of us.

We don't normally think about foundation work as returning a value on investments.

One of the things that we realized is you feel a responsibility to give your own wealth thoughtfully. But boy, if it's somebody else's wealth, you really better do it in a very careful and thoughtful way. We do think about what's the return on that and how many lives have been saved. Have we done it in the best possible way, the most efficient way, used the best partners? The other thing I'll say, though, is Warren does say, "I don't want you to be risk-free. You're taking on society's hardest problems. So take risks, swing for the fences." We've had some failures along the way, and Warren's been OK with that, because he knows we're trying to move very difficult problems forward.

There's a line right at the end of your letter that says, "The future will surprise the pessimists."

Despite the things that people read in the headlines, the world is getting better. Poverty has been cut in half—in half—in 25 years. We talk about the fact that 122 million children are alive because of the malaria vaccine work that's happened and bed nets getting out there. I travel to the developing world three times a year, and I'm out in remote, rural, dusty villages. Farmers are hooked up to markets; they're having more income; they're putting their kids in school. You have to look at the numbers, to rely on the facts, but it's palpable when you're out on the ground.

Still, it's not getting better fast enough. Bill and I are impatient optimists. We want it to get better faster, and we see things we have in the U.S. that, if brought in the right way to these countries, people will take them up and use them.

You and Bill talk in the letter about going on safari in Africa 20 years ago. You saw children dying because they were poor, not because of any other factor—simply because they were poor—and you found that the most unjust thing you'd seen. You say that experience has defined your marriage and also your partnership ever since.

We don't wake up a single day where we're not talking or thinking or doing something about the foundation. Even when we're on vacation at a beautiful beach somewhere in Hawaii, the foundation still comes up. One of us is probably reading a book, or we've seen something in the news, or we're reading a report. Bill left Microsoft earlier than he'd told me he would when we first got married. He'd already said, "I'm going to do philanthropy, but I'll do it when I'm in my 60s." In fact, he left Microsoft eight years ago to devote his life, to devote his time, to this. [Bill Gates is 61.]

It's reoriented our lives. We spend the most time on our family life and on the foundation. I think it constantly pulls at you. Are we putting our voices behind the things we most care about? Are we teaching our kids in the right way about the responsibility we feel that we have as a family? We've been so incredibly blessed and lucky to grow up in the United States and for Bill to start Microsoft. We've oriented our lives all around, basically, the foundation work.

I want to talk about one of the initiatives you've been a pretty fierce public advocate for, which is access to contraception and family planning. It remains politically sensitive. What do you see as the quickest ways to make further inroads in that battle?

I absolutely believe in

universal access to contracept

When you
can plan and
space the births of

children, they are
healthier,

and the woman's healthier.

She's less likely to die in childbirth, and this is incredibly important in the developing world, because many women still die in childbirth. It's a hallmark for the world that we have 300 million women who have access to contraceptives now in the developing world. There are still 200 million women asking us for them, and so what we need to do is give them options, lots of different options. They might decide that for a time, they're going to use a contraceptive that's short-acting, or they might decide eventually they want an implant. Many young girls in our own country are starting to use implants in their arms. Those are becoming very popular in the developing world, but we need to deliver them so women understand them and they have access to them if they choose to use them.

What are you seeing on the ground that's working in that part of the fight?

There are two pieces of this. Making sure that women have access, that we fill the supply chain with all the types of contraceptives we have in the United States. It's like they're begging me for them. I met a woman named Sadie in Niger who said, "Why is it that clinic right there used to have contraceptives and they don't anymore? Why can't I get them? Why do I have to walk 10 kilometers in the heat to get them?"

On the other hand, there are women who say, "I might know about contraceptives, but my husband won't let me use them." Or maybe it's a new idea to them. I've met women drawing water from a village well in Niger who have never heard of contraceptives. I then talked to an older group of women who had been using contraceptives in the same village. I said to them, "Hey, there are these young women who don't know about contraceptives. How are they ever going to get the message? They don't even come out of their homes very much except to go collect water." They said, "Don't worry. We talk. Women talk. We talk at the birth of children, we talk when we grind millet. We talk when we get together to wash clothes. We'll talk to them, and we'll tell them we use them and why we use them."

The way to reach those women is in very culturally sensitive ways. For instance, the government in Niger has set up something called a husband school, where they first teach the men why their children will be healthier if they can space their births, and why their women are less likely to die in childbirth. Then they are able to go in and talk to the women, and then it does become a husband-and-wife decision.

In this annual letter, Bill and I talk about self-help groups. In India, there are 75 million women in self-help groups. Each is usually about 30 women who get together. The group gets just a little bit of education about maybe contraceptives, or about a new seed they can grow on their farm, where they get more yield. They then take those new tools up with the original information they got, they start to learn about all kinds of other things, and suddenly these women have their voice, and they start to have agency. They'll tell you the way my mother-in-law treats me in my home is different from yours. The way my husband treats me is different. The way my sons treat me is different. I've met these groups where they've been meeting over two years, and they'll say to me, "Do you know what I did? We took to the government a rape case in our village that needs to be tried." That's what women's empowerment is. If you help get these groups formed and you start them with little bits of education, they eventually take it over, and boy, do they empower all the women around them. Because women talk.

Access to mobile phones and other forms of technological innovation has really boosted women's ability to participate in the financial sector. Where can the most gain be made?

The poor are not welcomed at banks. They'll tell you, if they get on the train or the bus, they have to spend the money to get on the train or the bus. They've got to travel to this city—they get robbed on the way, and then they get to the bank and they're not welcome. Yet, I'll be in a remote village where you wouldn't think there was a mobile phone, I'll be talking to a woman, and chickens will be running around, and all of a sudden, the phone in her pocket rings. We're finding that when men, and particularly women, have access to mobile banking on their phones, they can save a dollar a day, two dollars a day. When she can start to save into a bank account, and it's not in a tin can under their bed where a relative can come ask them for it, or it doesn't get eaten by rats, when it's in a mobile money account, then when it comes time for the school fees, she's got money to put her kid in school. When there's a drought, which happens a lot in Africa, or a food shortage, she's got money to go buy food at the market. It's transformative in these women's lives.

We've heard talk about rolling back women's access to contraception in the U.S., women's access to family planning, clinics worldwide that take U.S. aid money that will no longer be able to give advice on abortion, access to family planning...

I believe in universal access to contraceptives. I'm very open about that. The way this policy is being talked about this time would actually affect clinics that also give out HIV/AIDS drugs, tuberculosis drugs, malaria drugs. The U.S. gives to something called the Global Fund, which is for AIDS, tuberculosis, and malaria. Twenty million people are alive because of that fund. When I visit these very small clinics that the U.S. and the U.K. and France and Germany have all helped set up, and think that they won't be there in a community anymore because of the way we're going to implement a policy—wow, that doesn't sound to me like the Americans we are and the value we have for life. That just doesn't make sense to me.

What could be done to make that advocacy more clear? Will you be even more public about this?

In the U.S., less than 1 percent of Americans know that poverty has been cut in half in the past 25 years. We're trying to get the messages out about that, so people understand that these investments that we make, that we ask our government to make, are making a profound difference in the developing world. If we want peace and security in the United States, making these investments in the developing world is what allows people to stay where they are. They want a better life in their own community. I would say to people, "If you care about these issues, call your senator and say, 'I care about these foreign aid dollars continuing to be spent in the same way they have been in the past.'"

You and Bill have seen children die as you do this work. How are you able to compartmentalize that and keep looking at the broader picture? How does that experience affect you?

I try actually not to compartmentalize it. Out in Nigeria, I saw a young girl, Fatima, 3½ and very, very sick. Her mom was there with a 1-year-old in her arms. The dad was there. They'd taken out a loan to even get her to this clinic I was in. I had a few doctors traveling with me, and it looked to us that they'd given her the wrong diagnosis, but they were going to move her up to the next level of health care, which was the right thing to do. But the family was going to have to take out another loan to get her to this next clinic, if they could, and so her outlook was quite bleak.

I try to take time somewhere, before I come home and back to my busy life with three kids in Seattle, and process what I've seen, and realize the outlook for that little girl is very, very bleak. You have to take that in, as hard as it is, and you have to feel how heartbreaking it is. And then I try to use that in other places to fuel the work that we do, or to talk about a story like Fatima's, so people know what I actually see and experience. There's a thing we sometimes forget—that this care that we have for our children in the U.S. is exactly how people feel all over the world. Their child dying is as tragic to them as it would be to me if my child died, and we need to connect with that, because I think it's in that connection that we then decide to take action.

The foundation has committed \$80 million to collecting and analyzing data on women and girls. What are your ambitions in terms of harnessing big data to look at the gender gap?

What we don't measure, we don't work on. We haven't measured women. A lot of the surveys we do, the great household surveys that are done across Africa every five years, they're inadvertently biased against women. I'll give you an example: They start by asking the man and woman who has income in the household, and as soon as he answers, they don't even ask if there's secondary income in the household. In Uganda, when they asked the woman, "Do you have income?" it turned out it added \$700 million to their economy. They didn't even know that women had this amount of money and were working.

Once we start to understand these things about women, then we will actually know how and where to act. Without good data, it's very hard to act and to go and say to another government or a philanthropist, "Hey, we've put money into this issue for women. Do we know if we're getting a return? I'm not certain." If I can say to them, "I absolutely know I've gotten this many women signed up on mobile phones with this many bank accounts, and I've lifted this many women out of poverty," then they say, "Wow. We want to invest in that, too."

Are you surprised there's still this absence of data about women and girls' lives, not just in developing countries?

It always surprises me when we bump up against it. Even in the United States. A great example is women in technology. I have a computer science degree. At the time I graduated, in the 1980s, 37 percent of computer science degrees went to women. At the same time, in the late 1980s, law degrees and medical degrees were about the same. Now they've gone up. They're almost at parity with men now, or slightly above. Women are now down to 18 percent of computer science degrees.

We know
there's this
leaky
pipeline.
We lose young women and girls all the way
from kindergarten
through college
and into the workforce,
but nobody
knows why,

because we actually haven't collected the data to even understand the problem.

We're just now starting to collect that data to learn what can we actually do about it. That's just in the United States, and yet if only 18 percent of computer science degrees are women, and even fewer minorities—blacks and Latinos—holy smokes, we don't have a very diverse team at the table developing this technology that we're all using. That's a problem, and that's a measurement problem.

Why do you think it's gone from 37 percent to 18 percent?

Nobody knows for certain why it's gone down, but I do think it was right around the time that games became very male-centric. The games changed, and all of a sudden women started dropping out of computer science in droves. When you start to get where women are dropping out, then it sort of propels itself, because the fewer women that are in, then when you go to university, there are very few role models. There are very few female professors or associate professors. You don't look up now in the industry and say, "Wow, there are 50 women, I can tick off their names, who are doing great apps, or running this tech company, or doing that thing." Without role models to look up to, women say, "Ooh, I'm not sure that's for me." We have a lot of pieces to fix, both telling girls at a young age that you can be great at math and science and computer science. And we have a lot of things to fix, I think, in high school and in college, but then, also, this role modeling.

You have these dropout points, these loss points everywhere along the way. One thing we know, for even young kids and middle schoolers—let's say you send girls off to a

computer camp, to coding camp, in the summer. They're excited. They're interested to go. They go. But if all the posters on the walls are males, and you ask girls after the camp how they felt about how they performed in camp, you get a much lower rating than if the posters on the wall are half female, half male, or if all the posters on the wall are female.

A girl doesn't perceive she did as well if all she sees are male role models on the wall, so that's just this one little thing that we can change.

You come from Dallas, a middle-class family. Your father worked quite hard to put four kids through college. You worked hard. How do you identify with people in this country who feel they've been left behind, that there's this disconnect, that they don't feel optimistic?

I think there absolutely is poverty in the U.S. We need to acknowledge that, and we need to acknowledge that some of these amazing government programs have helped, but we probably need to do more. Bill and I were out in rural Appalachia, in Kentucky, last year getting to talk to communities about poverty and what causes them to not have hope and what causes hope. We were in this amazing public school called Betsy Lane. The leaders in that school were telling those kids, "You can go to college." And they were not only telling them, they were showing them how.

Education is the key. That is what we know lifts families up. My father was the first to go to college in his family. He was an engineer. He left New Orleans, went to Georgia, went to California, and eventually settled in Dallas. He thought that his four children should be college-going, and I got that message as young as I can remember. For all of my siblings and me, we had that vision and hope. And so around the United States, we need to make sure kids have great elementary schools, great high schools, and great options for college, whether it's university or community college.

Is our education system equipped to prepare children for the modern workforce and for the jobs of the future?

The public school system in the United States is failing two-thirds of the kids. We know that only a third of the kids who go through our K-12 public education system are actually prepared to go on for a career and for life. Many of the kids get into college, but then so many of them drop out in freshman year, because they get into these remedial classes—they don't have good enough algebra, they don't have good enough writing skills—and they get discouraged. No, our system is not working properly to educate kids, even for the jobs of today, much less the jobs of 10 years from now. We should do something about that.

The foundation has had many successes. It's also had struggles and failures. How frustrating are those challenges, and how much do they motivate you?

We're trying to do very ambitious things. We've only ever eradicated one human disease, smallpox, and we're trying to eradicate polio. Last year we thought we were on our way. It takes three years to certify [a place as] polio-free, and there were a few more cases in Nigeria in those very tough, remote areas, where there's a lot of violence. And so that was a very sad day for us at the foundation, for Bill and for me, those sort of 72 hours you're taking that in, and you think, "Oh, we thought we were there."

We know how hard it is on the partners. They're the ones who do that hard work in the field, the vaccinators who want it

to be done, the villages who want it to be done. Then you pick yourself up, and you say, “OK, we’re going to lead on this, and it can be done.” We know it can. We know why these outbreaks happen. We’ve learned from that; we’ve learned from that setback. We learned what we have to do next. And so you pick yourself up, and then you lead. We’re still confident we’re going to get polio, and I think we’re hopeful, knock on wood somewhere, that this will be the last year with a case of polio.

We don’t have polio in the United States anymore. It’s crazy that a child living in the developing world still gets that disease. That shouldn’t be.

Some people would say that bringing it down to just 32 cases worldwide, as it was last year, would be enough—let’s divert this money elsewhere.

Let’s say we left it at, oh, 30 children a year, only 30 are going to get polio. What happens is polio spreads. So it would be 600 the next year, and it would be 8,000 the next year, and then we’d be back up at 20,000. I think you have to say even of the 30, it’s tragic for any one child to get that disease when it’s a needless disease, but it would spread. Disease spreads. The other thing is, yes, it’s costing a lot to get down to these last-to-zero cases, but eventually we will get to the place where we won’t have to spend on polio at all anymore.

You were a rising star at Microsoft before you got married. You left to raise your three children, and over the past 15 years you’ve taken an increasingly public profile in fighting for the causes you believe in. How much of a learning curve has it been for you?

I was dating Bill, so I certainly knew what a public life he had to live. I knew what that looked like, but then to actually live it was kind of a different thing. I think where it really hit me, though, was once we had children, because I had to really think about how to have a private family life where I could allow our values to be instilled in our children, and for them to grow up as normally as they possibly could, given the circumstances of the wealth. I spent a lot of years where I was purposely not out in public, because that was my chance to take them to an activity, get to know other parents, be in their school, where I’m just another mom.

Then as they grew older, and I started to really think about the values I was teaching them—and particularly talking to my girls—to use their voice in the world and to be strong women, I realized, well, I need to role model that. They saw me role modeling, working hard at the foundation; they saw me role modeling, doing lots of trips to the developing world. They knew I cared deeply about issues, because I would talk about them, we would talk about them as a family, with Bill and our son and our two daughters around the dinner table.

I think they’re old enough now, and they’re far enough along in their own lives, that I can take a more public role. And I should, because I started to realize that I could give voice to issues for women in the developing world that I was seeing and for whatever reason no one else was. I made a very conscious decision that I would start to be more public.



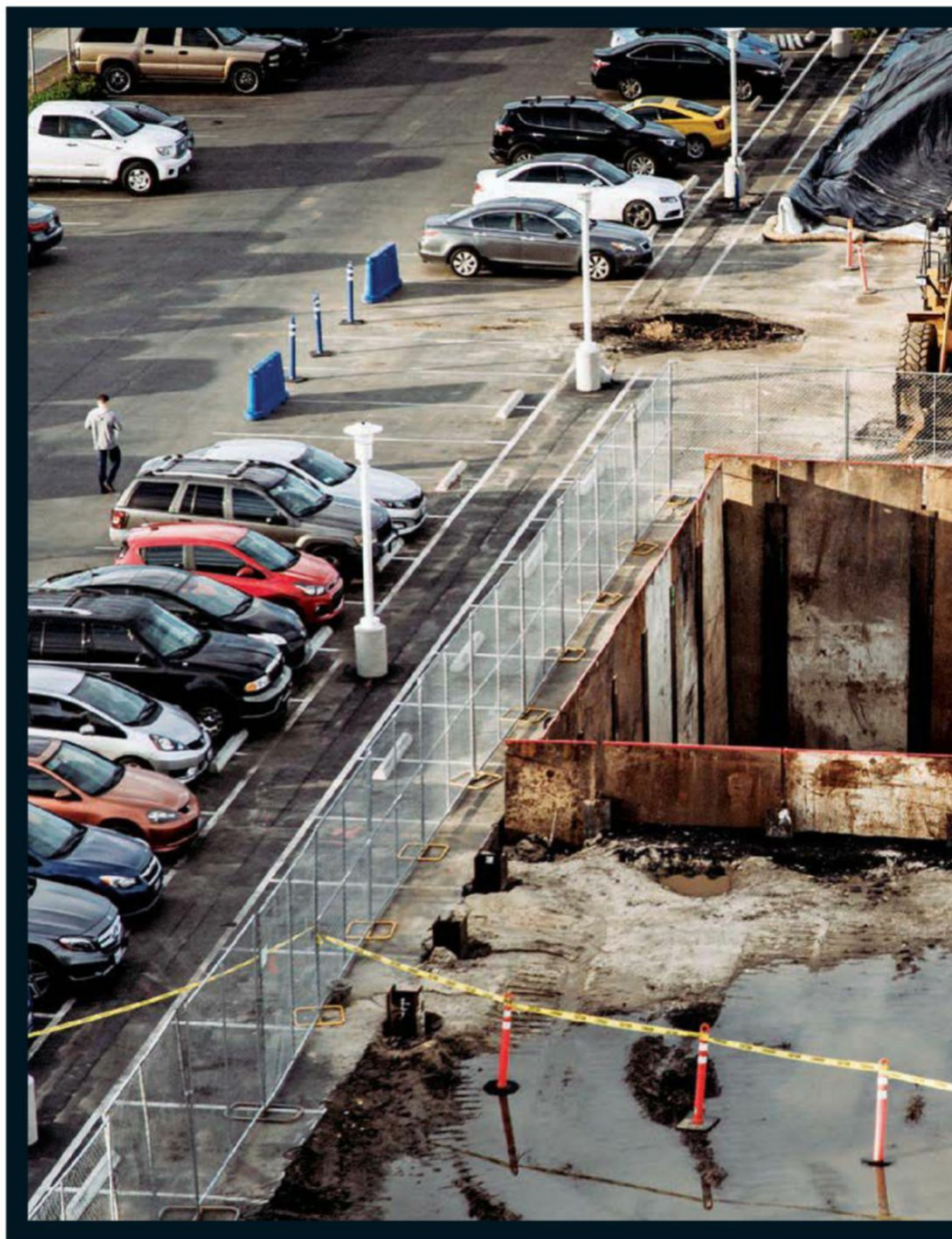
How much of your always pushing yourself comes from your upbringing?

I knew coming out of high school that I wanted to make a difference in the world. I really had this belief already, and maybe it had been instilled in me, I think, both by my parents and the nuns, these pretty liberal nuns who taught us in high school. I had this belief that one person could change the world, that any one act actually had a ripple effect. You don’t know how many people you touch. Yes, I was ambitious, and my parents gave me all the hope in the world that I could be anybody I wanted to be. They always said, “If you can get into a great college, you can light any dream you have. We see your potential.”

I certainly never thought this was the path it was going to take, but I like to go out and talk. I still talk to groups of young girls in middle school or high school, or sometimes in all-women’s groups, sometimes in mixed men and women’s groups, but to try and inspire people and have them realize that no matter how they give back, whether it’s in their own community, whether it’s working in a homeless shelter, they make a difference in somebody’s life. That helps give meaning to our lives. ⑤

THEZZED

VISION



T

he pit is at least 15 feet deep and more than 50 feet wide. It's in a nondescript lot at Crenshaw Boulevard and West 120th Street, not far from Los Angeles International Airport. If not for the huge pile of dirt next to it, you'd never know it was there. Seen from the top of the parking garage at SpaceX, the aerospace startup founded by Elon Musk, the hole is an eyesore among eyesores—a crater in asphalt, fenced in by rusty-looking steel plates.

But Musk, the chief executive of both SpaceX and the electric car company Tesla, is quite proud of this pit. He started digging as a spur-of-the-moment thing one

THERE'S A HUGE HOLE IN ELON MUSK'S TRUMP-ERA BUSINESS PLAN

BY MAX CHAFKIN

PHOTOGRAPH BY
EWAN TELFORD



The SpaceX parking lot near LAX

weekend at the end of January. The idea came to him while sitting in a traffic jam early on a Saturday morning in December. “Traffic is driving me nuts,” he tweeted. “Am going to build a tunnel boring machine and just start digging.” Within an hour, the project had a name and a marketing platform. “It shall be called ‘The Boring Company,’” he wrote. “Boring, it’s what we do.” Two hours passed, and Musk tweeted again: “I am actually going to do this.”

It sounded like a put-on. Musk is a serious person, but he can also be something of a loose cannon, making outlandish

statements designed to troll the press or simply amuse himself. In a 2015 interview with Stephen Colbert he semi-seriously endorsed dropping nuclear weapons on Mars; last year he implied on Twitter that he’s developing an *Iron Man*-style flying suit for the Pentagon. Most reporters assumed that the tunnel thing was another one of his jokes.

Musk wasn’t joking. At least that’s what he tells me as we sit in the SpaceX offices in Washington. For years he’s been thinking about tunnels—both out of a personal fascination and because they’d be an important component of the Hyperloop, the fanciful high-speed rail system he proposed in 2013. All the while he’s been quietly encouraging anyone who asks him about new business opportunities to consider digging for a living. “I think they were hoping I’d say some sort of iPhone app that they could make,” he says with a smile. “I would just say, ‘Do tunnels.’ It would obviously solve urban congestion—and we wouldn’t be stuck in soul-destroying traffic all the time.”

As Musk tells it, the L.A. traffic jam was a breaking point. Screw it, he thought, I’ll do tunnels myself. Within days of his tweetstorm, he acquired a domain name—BoringCompany.com—and appointed a leader for the project, Steve Davis, a senior SpaceX engineer who designed the guidance systems for the company’s first rocket. The barely sketched plan was to dig lots of tunnels for cars and high-speed trains. Mostly, Musk was going to approach it in his usual way: He’d figure it out as he went along.

One of the advantages of running two large industrial companies is that you can secure earth-moving equipment on short

notice. And so, around noon on a Friday in January, an excavation crew started digging. “I was like, ‘Hey, what’s the biggest hole we can make by Sunday evening?’” Musk says.

Shortly after the 2016 election, Steve Bannon, Donald Trump’s chief strategist, implied that the incoming administration would pursue infrastructure with a fervor not seen since the New Deal. “The conservatives are going to go crazy,” he told the *Hollywood Reporter*. “I’m the guy pushing a trillion-dollar infrastructure plan. With negative interest rates throughout the world, it’s the greatest opportunity to rebuild everything. Shipyards,

ironworks, get them all jacked up. We're just going to throw it up against the wall and see if it sticks." On Inauguration Day, Trump promised "new roads and highways, and bridges, and airports, and tunnels, and railways all across our wonderful nation."

Like the Boring Company itself, Trump's big-league construction agenda seems a little half-baked, but the possibility has already prompted private equity firms such as Blackstone and Carlyle to plan big infrastructure investments. "Infrastructure is at an inflection moment in the United States, where both parties agree on that one thing," said Joe Baratta, Blackstone's global head of private equity, during a Bloomberg TV interview in late January. He said his firm would raise as much as \$40 billion for the efforts.

Musk wouldn't seem to be in a particularly good ideological position to benefit from Trump's infrastructure largesse. He's a climate change hawk who was so closely identified with the Obama administration that Mitt Romney attacked Tesla during the 2012 debates. (Tesla had received a government-guaranteed loan in 2010.) In the next presidential election, Musk supported Hillary Clinton for president, describing Trump, in an interview with CNBC, as a man who "doesn't seem to have the sort of character that reflects well on the United States."

But after the election, Musk made several trips to Trump Tower, impressing the president and, especially, Bannon. A former Goldman Sachs banker, Bannon is the main proponent of Trump's "America First" economic nationalism. After meeting privately with Musk on Jan. 6, Bannon told an associate that he views Musk and his companies as embodying the kind of U.S.-based job growth that Trump intends to foster. For Trump, who's been publicly shunned by many Silicon Valley executives, the connection to Musk gives his administration a whiff of innovation and dynamism. In December, Musk was named to Trump's Strategy and Policy Forum, an advisory group that includes IBM's Ginni Rometty, Pepsi's Indra Nooyi, and JPMorgan Chase's Jamie Dimon.

Musk has warmed to Trump, too. In January he offered his support for Trump's chosen secretary of state, former ExxonMobil CEO Rex Tillerson, despite having frequently criticized oil companies in the past. "This may sound surprising coming from me," Musk wrote on Twitter, but "Rex Tillerson has the potential to be an excellent Sec of State." He noted that Tillerson has expressed openness to a carbon tax, a policy Musk has long supported. After Trump issued a temporary ban on immigration from seven Muslim-majority countries, Musk criticized the order but also urged his many left-leaning followers to read its full text before freaking out.

Whereas Uber CEO Travis Kalanick left the Strategy and Policy Forum in response to protests, Musk is sticking with it. "Attending does not mean I agree with actions by the administration," he wrote in a statement. "I believe at this time that engaging on critical issues will on balance serve the greater good."

Our conversation at SpaceX takes place a few hours after his Feb. 3 meeting with Trump. Musk is attired in his strategy-forum best—black suit, white shirt, blue tie—and seems sleep-deprived and loopy as he deflects my question about Trump and changes the subject to the Boring Company, launching into what I can best describe as a tunnel-themed comedy routine.

"My other idea was to call it Tunnels R Us and to essentially troll Toys 'R' Us into filing a lawsuit," he says, letting out a loud and well-articulated ha-ha-ha-ha. "Now we've decided to troll AT&T instead! We're going to call it American Tubes and Tunnels."

When I ask him if the tunnel venture will be a subsidiary of SpaceX or an independent company, he responds cryptically. "Don't you read my Twitter? The Boring Company. Or TBC.

MUSK POINTS OUT THAT

To Be Continued." An aide chimes in: Yes, the Boring Company, aka To Be Continued, aka Tunnels R Us, aka American Tubes and Tunnels, aka whatever, will indeed be an independent company.

The Boring Company has no full-time employees yet, nor does it have a clear business model, though government contracts will almost certainly play a role. Musk says the tunneling business is a bit like the aerospace industry, which he shook up by starting SpaceX in 2002. Rockets hadn't changed much since the Apollo program, and research projects were slow and expensive. SpaceX differentiated itself by offering low, fixed-price launches, eventually winning a \$1.6 billion contract from NASA to run supply missions to the International Space Station.

Tunnel technology is older than rockets, and boring speeds are pretty much what they were 50 years ago. As with space launches, tunnels are often funded through cost-plus government contracts, in which the contractor assumes no risk for cost overruns, which tend to be enormous as a result. Famously, Boston's Big Dig, which moved a section of Interstate 93 underground, was delayed by roughly eight years and cost \$12 billion more than originally planned, but all tunnels tend to be wildly expensive. In L.A., plans to extend the subway's Purple Line by 2.6 miles will cost more than \$2.4 billion and take almost 10 years. "It's basically a billion dollars a mile," Musk says. "That's crazy."

Musk wouldn't comment on Trump, but a person close to him says that while the Boring Company would be open to building tunnels as part of Trump's infrastructure plan, it intends to move forward regardless of what happens in Washington. Musk says he hopes to build a much faster tunneling machine and use it to dig thousands of miles, eventually creating a vast underground network that includes as many as 30 levels of tunnels for cars and high-speed trains such as the Hyperloop.

Objections spring to mind. Such as: Wouldn't having hundreds of feet of hollow tunnels destabilize the ground? Nope, Musk says, the mining industry does it all the time. "The earth is big, and we are small," he says. "We are so f---ing small you cannot believe it." Not only are these megatunnels possible, he argues, they're the only way we can rid ourselves of the scourge of traffic.

"We have skyscrapers with all these levels, and we have a flat, two-dimensional road system," he says. "When everyone decides to go into these structures and then exits them at the same time, you're going to get jammed." Tunnels, on the other hand, would represent a 3D transportation network.

Musk chose the SpaceX parking lot as the site of his first dig, mostly because it was convenient and he could legally do so without city permits. The plan is to expand the current hole into a ramp designed for a large tunnel boring machine and then start digging horizontally once the machine is 50 feet or so below ground, which would make it low enough to clear gas and sewer lines and to be undetectable at the surface. The company, such as it is, is working on securing permits and hopes to have them by the time the tunnel hits the property line. At the moment, Musk won't say exactly where this "demo tunnel," as he calls it, will lead—only that it will accommodate cars and be the very beginning of a vast underground transportation network.

As crazy as tunneling sounds, Musk points out that it's arguably less crazy than Silicon Valley's go-to traffic solution: flying cars. Google's Larry Page has funded two personal-aircraft startups, Zee.Aero and Kitty Hawk, and companies such as Uber and Airbus have skunk works. But Musk thinks flying cars are a dumb idea, at least for city travel. "Obviously, I like flying things," he says. "But it's difficult to imagine the flying car becoming a scalable solution." As long as the laws of physics hold, he explains, any flying car will need to generate a lot of downward force to stop it from falling out of the sky, which means wind and noise for

those on the ground, not to mention debris from midair fender-benders. "If somebody doesn't maintain their flying car, it could drop a hubcap and guillotine you," he says. "Your anxiety level will not decrease as a result of things that weigh a lot buzzing around your head."

Eventually the aide says it's time for me to ask my last question. But Musk isn't done. He pulls off his tie, lays it on the table, and looks at me seriously. "You want to come see it?" he asks.

"Holy shit. Holy shit! Ha-ha-ha-ha!"

By now the sun is low, and Musk, SpaceX's Davis, and I are dangling 20 stories in the air, on a large steel platform surrounded by a railing. The "man basket," as it's known in the construction business, is being lowered by an enormous crane into a 100-foot-deep shaft not far from the baseball stadium where the Washington Nationals play. I'm freezing and terrified. Musk, with a wide, open-mouthed smile, stares down into the darkness. He wears a safety harness, a hard hat, and knee-high muck boots over the suit he wore when he met the president.

"Holy shit," he says again as we step into several inches of sloppy mud. "This is cool." It's his first time seeing a tunnel-boring machine up close.

Musk has brought me to the site of a municipal project to kick the cutting wheels, so to speak, on a used boring machine he's considering. The machine is 26 feet in diameter, about 400 feet long, weighs 1,200 tons, and is nicknamed Nannie. It's been used by Washington's water utility to dig a tunnel to prevent sewage from overflowing into the Anacostia River. New machines normally cost at least \$15 million, but a decade of frantic subway construction in China has created a glut, and lightly used models can be had for 90 percent off sticker.

Nannie, made by the German company Herrenknecht, has been digging only since 2015, but it looks ancient, its surfaces scaled by rust or caked in mud. Although the head looks as you'd expect—like a giant power drill—most of the work happens in the back, where conveyor belts transport mud to the surface, hydraulic pistons brace the wall, and small, narrow-gauge trains haul sections of precast concrete rings to line the tunnel. There are also systems to bring in grout and various foams as well as enormous ducts to pump out exhaust and bring in enough clean air for Nannie's crew of 15 or so. "This is like an ecosystem," says Musk.

He plans to use a machine like this to test improvements in tunneling technology. He thinks that with more power, better materials, and a design that allows it to continue digging while installing the tunnel walls—a feat that's impossible today—the Boring Company will be able to drastically reduce the price of digging. "To make it a little better should be easy," he says. "To make it five times better is not crazy hard. To make it 10 times better is hard, but nobody will need to win a Nobel Prize. We don't have to change the standard model of physics."

As we walk through the machine, Musk and Davis pepper the tunnel's project manager, Shane Yanagisawa, with questions. They ask about grouting materials and staffing, but mostly about speed. Yanagisawa says the limiting factor is muck. Nannie's conveyor belts can carry only so much dirt at a time. The fastest he thinks the machine can possibly run is 75 millimeters per minute. In a typical week, it moves through 300 feet of clay.

Musk nods. "We're trying to dramatically increase the tunneling speed," he says. "We want to know what it would take to get to a mile a week? Could it be possible?"

"Wow," says Yanagisawa, taken aback.

As Musk puts on his harness and steps back into the man basket

for the return trip, he seems only slightly discouraged. "It may make sense to start with something smaller," he says. "But I think we can simplify this a lot."

As any longtime resident of Boston can tell you, tunneling tends to resist optimism. The average bridge or tunnel project costs 32 percent more and takes 22 percent more time than expected, according to Bent Flyvbjerg, a professor at Oxford's Saïd Business School who studies large-scale infrastructure. The process is slow in part because the machines inevitably bump into unforeseen obstacles, such as boulders. "No matter how many tests you do, how many samples you take, you can't know exactly what you're drilling into," Flyvbjerg says.

Even so, Flyvbjerg is enthusiastic about Musk's plan. "I wouldn't just laugh it off," he says. He thinks that Musk can speed up tunneling just by doing some simple things, such as having enough spare parts on-site to avoid long waits for repairs. "The construction industry really needs disruption," he says. "It's the only sector of the economy that hasn't improved its productivity in the last 50 years." Musk, he notes, "has a long track record of disruption."

This confidence doesn't so much stem from anything Musk has said about tunnels, nor from any special tunnel expertise he possesses (i.e., none). Rather, it's a handicapping of Musk himself: a guy with an uncanny ability to recruit smart people to wildly risky causes, while finding ways to make these causes—the colonization of Mars, an electric car that's faster than a Ferrari—seem achievable rather than ridiculous. SpaceX's cheap rockets were perfectly tailored to an effort undertaken by NASA starting in 2004 to privatize missions to the International Space Station; Tesla's growth was spurred by a tax credit for buyers of electric cars. Both of these policies were created by the George W. Bush administration, then embraced by Barack Obama.

Musk rarely talked about the job-creating potential of his endeavors during those years, focusing instead on the advantages of electric cars over gas-powered ones and on the sheer awesomeness of space travel. "People are mentioning jobs more these days," he tells me. "But I sort of take it for granted that if you solve problems, then it takes people to solve them."

Lately, he's been more explicit about the economic impact of his work. "My goals," he recently tweeted in defense of his relationship with Trump, "are to accelerate the world's transition to sustainable energy and to help make humanity a multi-planet civilization, a consequence of which will be the creating of hundreds of thousands of jobs and a more inspiring future for all."

Musk might be an environmentalist, and Trump might believe climate change is a Chinese hoax, but Musk's companies employ 35,000 people, many of them working the very sorts of manufacturing jobs that Trump says are key to America's future. Last year, Tesla began operations at its Reno, Nev.-based Gigafactory, which will eventually be the largest battery plant in the world. SolarCity, the solar panel company that Musk helped start and which recently merged with Tesla, opened a 1.2 million-square-foot factory in upstate New York.

The Boring Company, Musk suggests, is a natural extension of this: "It would certainly create a lot of jobs." Then he smirks. "A trillion jobs," he says. "With a T." **■**

—With Joshua Green



THE OLIGARCH WAITS

Dmitry Firtash is wanted by the U.S. on a bribery charge. What the Trump Justice Department does next could say a lot about the president's intentions toward Russia

By Robert Kolker

Photograph by Mark Peckmezian





The oligarch is hungry. So Dmitry Firtash crams into a small elevator with his entourage. Slowly, they rise to the private rooftop level of Do & Co, a modernist hotel in the otherwise Old World tourist heart of Vienna. The doors open into a tiny, glass-walled private dining room that seems like a long catwalk suspended in air, affording the oligarch a 360-degree view of the European capital he's called home the past three years. Downstairs, he's left behind his two bodyguards, who will spend the evening glowering at anyone entering or leaving the elevator. Up here, he's exposed yet insulated—a billionaire in a gilded cage.

The waiters bring sushi and crispy shrimp, followed by bouillabaisse, fish, and steak. Firtash says no to a lot of it, including wine. Seated at the table, he pinches his belly self-consciously. A firefighter in his younger days, he says he still trains in martial arts six days a week. He's 51, pale, burly, and broad-shouldered, with a shock of salt-and-pepper hair and a fighter's crooked nose. Sipping water, he works to refute, or at least neutralize, the various stories that have been told about him. "I have never been to the U.S.," he says in Russian, an interpreter by his side. "I don't understand clearly the priorities of people there, what drives them. I'm sure that what they think about me is negative, because there was a special machine of propaganda organized against me."

Outside of a John le Carré novel, there may be no more perfectly embroiled middleman than Firtash. Russia and the former Soviet republics have more than a few embattled oligarchs, but only one stands accused of being the missing link between Vladimir Putin and the Trump administration. Last summer, in the thick of the U.S. presidential campaign, a host of news reports noted that Firtash, a Ukrainian natural gas magnate, was the onetime business partner of Donald Trump adviser Paul Manafort, the Washington political operative who'd worked in Ukraine for Viktor Yanukovich, the country's Russia-friendly kleptocratic president. (Yanukovich, for his part, appeared in the explosive, unverified opposition research dossier on Trump that went public just before the inauguration: He was the Ukrainian politician who was said to have assured Putin that no one would ever trace alleged cash payments to Manafort back to the Russian president.)

But the connection to Manafort, and Manafort's connection to Trump, represent just the latest alleged entanglement for Firtash. There are the reports that, as a 50-50 partner in Ukraine's natural gas business with Russia's state-run Gazprom, he made his billions as Putin's handpicked surrogate. There are the accusations, leveled by the U.S. Department of Justice, that Firtash benefited from an association with one of the world's most powerful organized crime figures, Semion Mogilevich, who has appeared on the FBI's Ten Most Wanted Fugitives list. Then, paradoxically, there are the warm friendships Firtash has cultivated with members of the British Foreign Office and the praise he's received from cultural figures such as the French author and public intellectual Bernard-Henri Lévy. ("Frankly speaking," Lévy tells me, "I do not believe all the terrible things I read about him.")

Finally, there's the criminal case Firtash is facing in the U.S.—a case with an imminent court date that, given the seemingly never-ending stream of allegations about the Trump administration's relationship with Russia, is sure to be seen as a foreign policy test. The three-year-old indictment, out of a federal court

in Chicago, accuses Firtash of plotting a bribery scheme to set up a \$500 million titanium business in India, with Boeing as a potential client. (The deal never happened.) Firtash was arrested in Vienna in March 2014, three weeks after Ukraine's Maidan Revolution ousted Yanukovich from office. But almost right away, an Austrian judge took the unusual step of denying the U.S. government's extradition request, which he described as possibly politically motivated: "The aim was clearly to prevent [Firtash] from undermining the political interests of the U.S.," the judge wrote at the time, "and with his arrest [he] was to be removed from Ukrainian politics." Firtash was known to have supported Yanukovich, whom the U.S. opposed.

The U.S. Department of State disputed the judge's decision, saying the case fits squarely under the Foreign Corrupt Practices Act, and the Justice Department announced plans to appeal. Since then, Firtash has been a sort of prisoner in Austria, unable to leave the country for fear the U.S. will have more success extraditing him from wherever else he may go. Ukraine isn't an option, either; the current government has turned its back on him. For now, Firtash is a very rich man without a country. Not that he doesn't continue to maintain a proprietary interest in his native land: In addition to his natural gas interests, he owns TV stations and dominates the country's fertilizer and chemical industries. "First of all, I've never left," Firtash tells me. "I work with Ukrainian businesses and people. My plants keep on working. People come here, to me, to discuss everything. Many people cannot understand—I live for Ukraine."

The U.S. is scheduled to appeal Austria's extradition decision in a Vienna courtroom on Feb. 21, just as Ukraine has once again become a flashpoint in the relationship between the U.S. and Russia. Trump's national security adviser, Michael Flynn, resigned after allegedly concealing that before the inauguration he consulted with the Russian ambassador about the future of U.S. sanctions. The White House's position on Ukraine's war with Russian-backed separatists is hopelessly muddled: First, Nikki Haley, the U.S. ambassador to the United Nations, blamed the violence on Russia; then Trump downplayed that position in a statement of his own. The FBI, meanwhile, is continuing to investigate Russia's influence on the Trump campaign.

In all this, Firtash again finds himself the man in the middle—a canary in a coal mine for the Trump Justice Department. After Russia invaded Crimea in 2009, the Obama administration was widely perceived to be retaliating against Putin by going after his oligarchs. Should Firtash be forced into the U.S. to face charges, many observers have wondered, what might he have to offer the U.S. in exchange for a plea? Perhaps intelligence about Putin? About others in his inner circle? The U.S. has fought for extradition for three years—but there's a new president now. The Justice and State departments aren't commenting on the case. But if the administration reverses course and no longer pushes hard on the Firtash prosecution, that would send a pretty clear signal that the president's embrace of Russia and Putin is real.

First of all, I don't understand this word, 'oligarch,'" Firtash says over dinner. "I would never call myself an oligarch. In my view, oligarchs are the servants of the state."

So much talk about corruption and buying political influence, he says, gets it backwards. "Business doesn't create corruption," he says. "It's civil servants and the politicians that create corruption in the country. Show me

any businessman who would be willingly giving out money.” Businessmen such as he, Firtash argues, are what’s needed to keep a society stable, to create jobs and pay taxes. “From my point of view,” he says, “rich people have to be supported.”

Firtash spent his childhood in rural Ukraine and admits to certain Luddite inclinations: He doesn’t text, send e-mails, or operate computers, smartphones, or tablets. The one cell phone I see him use looks to be at least 10 years old. “I don’t want to live in the virtual world,” he tells me, “and waste time on this technological stuff.” Then again, his critics would say he has more reasons than most of us to avoid leaving a digital trail.

Firtash’s primary objection with most of what’s said about him, it seems, is the suggestion that he’s anybody’s stooge. He became rich, he says, through a combination of hard work and excellent timing. His favorite childhood story, one he’s told many times, is about how his family grew tomatoes and sold them in their village in Western Ukraine to supplement their paltry income under Soviet rule. “Today it would be called entrepreneurial dexterity,” he says. He leaves out some of the less flattering career highlights, like the time in 1995 he reportedly was jailed for three months for smuggling contraband alcohol.

After attending technical school and serving in the Soviet Army, Firtash married (the first of three marriages) and started a family. When the USSR collapsed, he was in his mid-20s and, like everyone around him, penniless. He moved to Moscow and slowly developed enough contacts to make money in the emerging barter economy that sustained the newly independent republics. With no reliable currency, every transaction required a middleman. His first major deal, he says, was trading Ukrainian powdered milk for Uzbeki cotton, then selling the cotton abroad, taking a cut for himself.

His big break came in the early 1990s with natural gas in Turkmenistan. “Turkmenistan had lots of gas,” he says, “but they had no idea how to sell it.” He offered a way to do it that was independent of Russia. According to Viktor Yushchenko, the governor of Ukraine’s central bank at the time, Firtash’s Turkmenistan gas deal was an important first step toward establishing Ukraine’s independence from Russian natural gas. “We were 100 percent dependent on Russian gas, Russian oil, so many products coming from Russia,” says

Firtash’s primary objection with most of what’s said about him, it seems, is the suggestion that he’s anybody’s stooge

Yushchenko, who served as Ukraine’s president from 2005 to 2010. “The biggest thing Russia wanted to see then was the failure of Ukraine. Russia started to block the energy supply to Ukraine, and we didn’t have any alternate supply. We had to fight for a long time to get rid of that monopoly.”

By the end of the ’90s, Firtash’s barter arrangements had gradually converted to cash. He became, despite his current protestations, an oligarch, personally controlling the transfer each year of 68 billion cubic meters of Central Asian gas. Some 14 billion cubic meters to 17 billion cubic meters, he estimates, were resold to Europe; the rest went to Ukrainian consumers. Then, by his account, in 2003, Putin swooped in to wet his beak. This wasn’t Putin handing him a piece of the gas industry, Firtash argues; it was Putin taking a piece of Firtash’s gas interests for himself. After a year of negotiations, Firtash emerged with control of half of a new company, RosUkrEnergo (RUE). The other half was owned by Gazprom. This was, in Firtash’s estimation, the big squeeze. “I didn’t enter their business,” he says. “They entered my business. All that I earned myself, I was supposed to share with Gazprom.”

Firtash says he never spoke with Putin personally about the arrangement. “I saw him, of course, but we never met, no,” he says, trying to dispel the notion that he’s close to the Russian president. (Russian government sources, too, have officially denied that Firtash is close to Putin.) But Putin, Firtash says, is in complete control of Gazprom; the deal couldn’t have happened without his say-so. Yushchenko agrees: “The only person in Russia who knows where and how much gas is to be supplied, that’s Putin.”

In the years that followed, many in Ukraine would call Firtash’s agreement a sweetheart deal. A Reuters investigation in 2014 showed that Gazprom sold more than 20 billion cubic meters of gas to Firtash over four years, four times more than publicly acknowledged, at a price so low that Firtash’s companies stood to make \$3 billion. Following the pattern of Russian oligarchs in Putin’s

Yanukovych and Firtash at the opening of a chemical plant in 2012



Friends and Foes



Paul Manafort

Trump's former campaign chairman and Firtash did business together



Viktor Yanukovich

The kleptocratic ex-president gave Firtash back his gas business



Viktor Yushchenko

This former Ukraine president is now a supporter of Firtash's



Petro Poroshenko

Ukraine's president supports deoligarchization—so, not a friend



Yulia Tymoshenko

A Ukrainian cause célèbre, she's clashed with Firtash



Semion Mogilevich

Wanted by the FBI; Firtash battles whispers that they're connected



Vladimir Putin

The real reason the Obama administration went after Firtash?

circle, Firtash also, according to Reuters, received credit lines of as much as \$11 billion, enough to expand his businesses from gas to other industries. "That again shows you the extremely close ties to Moscow," says Taras Kuzio, a Toronto-based Ukrainian politics scholar. Firtash's defenders have noted that Ukraine still got gas at below-market rates that sustained jobs in the country.

Russia was never satisfied with their partnership, Firtash argues. After a few years, he says, Gazprom attempted to cut side deals with the other former republics. Then came Yulia Tymoshenko, prime minister in the Yushchenko government, who canceled the RUE deal in 2009 in the name of liberating Ukraine from unnecessary "intermediaries." In the West, Tymoshenko is known as one of the heroes of Ukraine's 2004 pro-democracy Orange Revolution; but in Firtash's telling, she's a venal politician who targeted him for her own financial gain. "She opened a public war against me," Firtash says, and then she allowed Russia to drive up the price of gas immediately. "For Russia, this was a great solution," he says. "All they tried to achieve in 2004 [with the RUE deal], they finished successfully in 2009 and got rid of me."

When Tymoshenko mentioned intermediaries, she didn't mean just Firtash. She also meant Semion Mogilevich, a Ukrainian businessman whom the FBI has said runs a crime ring that spans 30 countries and has a hand in murder, public corruption, money laundering, and weapons trafficking. As early as 2006, an ally of Tymoshenko's made a statement in Ukraine's parliament accusing RUE of having Mogilevich as a silent partner. The question of Firtash's ties to Mogilevich circulated for years until finally, in 2010, WikiLeaks released a confidential memo written two years earlier by William Taylor Jr., then U.S. ambassador to Ukraine, recounting a meeting he had with Firtash. In that meeting, Taylor wrote, Firtash said that he wouldn't have gotten far in the gas business without the blessing of Mogilevich. Firtash has maintained that his comments were taken out of context and he has no link to Mogilevich. In my interview with Firtash, he refuses to comment on Mogilevich and the bribery case—in fact, those are the only matters his lawyers persuaded him not to comment on in advance of the extradition hearing.

In 2010, Firtash's gas business was restored, thanks to a new president, Viktor Yanukovich, whom Firtash supported and who won his election with help from a paid political consultant, Manafort. This is the part of the story that came to light last summer in an exposé in the *New York Times*: The paper discovered ledgers suggesting that Yanukovich paid \$13 million to Manafort in

cash. No one has proved conclusively that those payments happened. Firtash's name emerged as a possible connection, thanks, once again, to his old adversary Tymoshenko, when reports surfaced of a lawsuit she'd filed against Firtash and Manafort in civil court in the U.S. in 2011. In the complaint, which was rejected on jurisdictional grounds, Tymoshenko said a real estate project that Manafort and Firtash planned—a hotel and luxury shopping mall on the site of the Drake Hotel in Midtown Manhattan—was little more than a money-laundering operation. In the words of the complaint, it helped Firtash "to hide illegal kick-backs paid to government officials"—later specified as Yanukovich—"and place a significant portion of the proceeds from the gas contracts outside the reach of Ukrainian courts."

"She was wrong in everything," Firtash says of Tymoshenko. "She lies all the time. In order to money launder, you need to have dirty money to start with. I always had clean money."

The allegations of a financial arrangement between Firtash and Manafort became a weapon for Democrats last year. Manafort resigned as Trump's campaign manager in August, shortly after the ledgers were uncovered. Reached on the phone in February, Manafort hotly denies ever receiving cash from Yanukovich, laundering Firtash's money, or serving any Russian agenda. "Making Yanukovich Putin's stooge, and me a link to Putin, is the antithesis of the facts," Manafort says. "I was integrally involved in the process that resulted in Ukraine becoming a part of the West. This was the opposite of what Russia wanted." The real estate deal with Firtash, he says, "never got off the ground. Nothing ever was formalized, nothing was ever signed, no money ever transferred hands."


At dinner with Firtash, I ask how he came to invest in the Drake Hotel project.

"I never invested," he says.

Then what about the reports that he put \$25 million in an escrow account for the developers? And the \$100 million investment fund that Manafort helped him set up?

"We were considering that project," he replies. "I wanted to be involved. I thought that America, at some stage, can be an interesting platform for investment." But then, he says, he changed his mind.

From the start, Firtash's legal team has argued that the timing of the U.S. indictment, issued in October 2013, was suspicious. In his 2014 decision to



“My view is in the nearest future, it will not be possible for him to return. They need to send him a message”

deny the extradition, the Austrian judge, Christoph Bauer, noted that a U.S. State Department delegation had just traveled to Kiev to push then-President Yanukovich to sign an association agreement with the European Union that would pull Ukraine further away from Putin's influence. As soon as Yanukovich indicated he might not sign, the U.S. called on Austria to arrest Firtash. The U.S. diplomats knew he had influence on Yanukovich, the Vienna judge said, and the intent seemed to be to remove Firtash from circulation and weaken Yanukovich's position.

Firtash got out of jail a week later on \$174 million bail furnished by a friend of his: Russian billionaire Vasily Anisimov, who—stand by for more entanglements here—is a business partner of one of Putin's closest allies, Arkady Rotenberg, who in turn had helped Firtash rebuild his natural gas business in 2010. The current Ukrainian government, under President Petro Poroshenko, is in the middle of a campaign of “deoligarchization” and has vowed to arrest Firtash on behalf of the U.S. if he comes home. “My view is in the nearest future, it will not be possible for him to return,” says Leonid Kravchuk, who from 1991 to 1994 was the first president of Ukraine. “They need to send him a message.”

Yanukovich turned out to be a kleptocrat of the first order, building a \$250 million estate for his family with public money, and as Ukrainians took to the streets, he fled to Moscow. Firtash has never stopped trying to influence Ukraine's fate from abroad. In op-eds and interviews, he's explained his belief that Ukraine should be like Switzerland, a neutral bridge between East and West, with allegiances neither to Russia nor to Europe and the U.S. At first, he supported Poroshenko, but has since changed his mind. Poroshenko, meanwhile, has defied Putin not only through his deoligarchization program but also by supporting Hillary Clinton's presidential campaign, which puts Poroshenko in a difficult spot now.

The Trump transition team and administration appear to have spent the past several months in contact with forces that would work to destabilize the Poroshenko government—an outcome that, depending on who replaces him, could serve the interests of Putin. Tymoshenko is still in the mix, too, her profile bigger than ever after a prison sentence during the Yanukovich presidency turned her into more of a cause

célèbre. Certainly if regime change happens in Ukraine, Firtash stands ready to step in and put his billions to work. His factories employ 110,000 people there—some of whom, he says, he continues to pay even as the continuing war has forced the factories to close temporarily. In Vienna last year he sponsored a conference to propose a plan for modernizing the Ukrainian economy—an effort that includes, among other measures, creating a less erratic tax policy that would make the country more hospitable to investment from foreign business. His efforts have won praise from two of Ukraine's past presidents, Yushchenko and Kravchuk, as well as the French intellectual Lévy, who's attached himself to the idea of Ukraine's reinvention.

“Old Ukraine has been cannibalized by its oligarchs, that's sure,” Lévy writes in an e-mail. “But I am sure, too, that Firtash is not worse than the others! There is clearly, among the Ukrainian political class, some sort of a settling of accounts turning against him. And there is also the fact that he has the reputation of being pro-Putin. But the impression I always had during our conversations about my dream of a Marshall Plan for Ukraine is that he is, in his way, a true Ukrainian patriot, with a very touching attachment to his country.”

“I find this man a truly novelistic character,” Lévy concludes. “This, being who I am, is a real compliment.”

In Vienna, where his wife and two small children fly in from Kiev to see him on weekends, Firtash has set up a well-appointed base of operations. His mansion on Edenstrasse, near the Vienna State Opera, is the former home of Adele Bloch-Bauer, a wealthy patron of the arts whose portrait by Gustav Klimt was stolen by the Nazis and became known as *Woman in Gold*. When Firtash first moved in, he wasn't aware that the Hollywood movie about the painting (also called *Woman in Gold*) had just come out. He assumed all the people taking pictures outside his house were from the CIA.

As our dinner ends, Firtash maintains that the real problem with Ukraine now is with the people in power. “These people will go—today, tomorrow, or the day after tomorrow,” he says. “The country will stay.” He has a different vision for Ukraine, a nationalist vision. “I think it's best for Ukraine to be on its own. Ukraine, historically and geographically, has a strong territorial position. It needs to use it. We can become the industrial platform for Europe.”

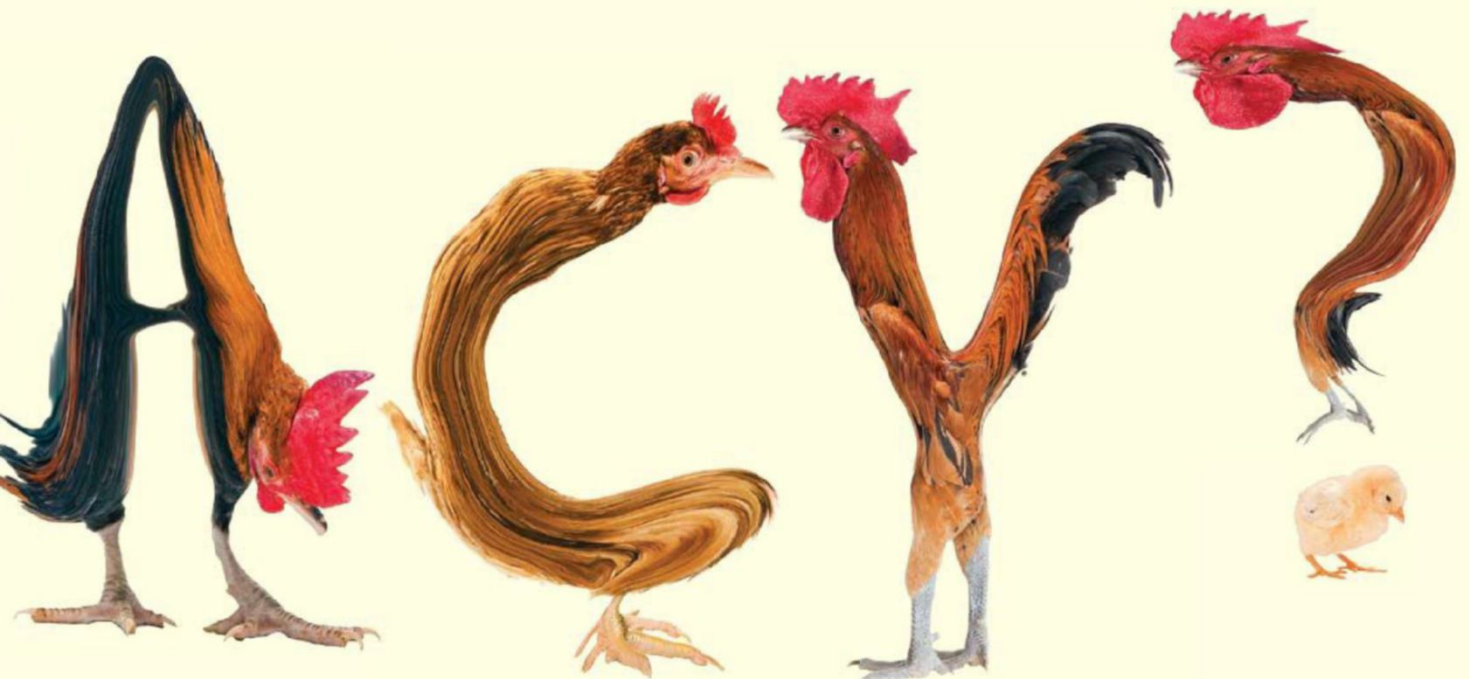
It's a vision not unlike that of the president who's in a position to help him. “What is Trump doing?” Firtash says as waiters clear the dessert cart. “He's saying, ‘We need to make our own production. We will sell what we produce. We will give you loans, and you will serve the loans and give the money back to us.’ I perfectly understand what he's saying. That signal is clear to me. Ukraine is a small country, and clearly we cannot do like the U.S., but I understand what he's doing.”

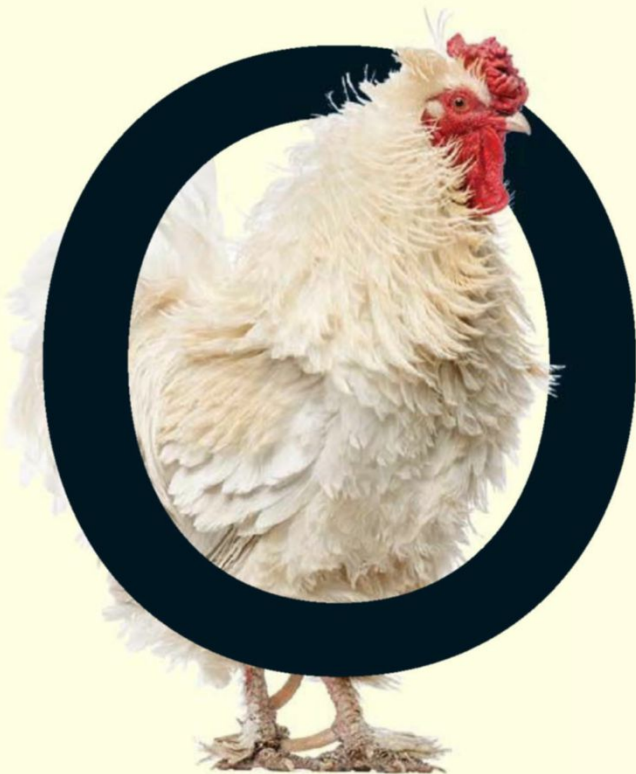
If the Austrian court beats back the extradition again, Firtash's legal team will move to have the indictment against him dismissed. There's no indication from the Justice Department that it might back off, and doing so would be especially provocative right now in the wake of the Michael Flynn blowup. But this may be what Firtash has to offer Trump, should the case against him end up withering away: a chance to make Ukraine great again, with someone else footing the bill, and a new government willing to do business with both Russia and the West. How could Trump refuse an offer like that? **B**





Inside the chicken industry's
secretive info-sharing service
by christopher Leonard





n Dec. 8, 2009, Joe Sanderson, the chief executive officer of Sanderson Farms, held a routine earnings call with bank analysts. His aim was to reassure them that the company's recent profits weren't about to disappear, as the chicken industry's usual business cycle dictated they would. For decades, poultry had been volatile in a frustratingly predictable way: When times started getting good, companies flooded the market with chicken, causing prices to crash. Sanderson Farms was having a pretty strong year, so naturally the analysts were expecting a downturn.

Sanderson told them that the industry had learned from its mistakes. There wouldn't be a bust this time. Then he said something rather extraordinary: His competitors weren't planning to ramp up production. He knew this because it had been communicated to him by a virtually unknown company. "I see a lot of information from Agri Stats that tells me nobody's going to ramp up," he said. Sanderson was right. The following year, Sanderson Farms reported that its profits had surged 64 percent. For the next six years, strategic production cuts and skyrocketing profit margins were the norm in the \$90 billion chicken business.

At first the transformation puzzled industry watchers. Some speculated that a merger spree during the 1980s and 1990s was responsible—with fewer decision-makers in charge and fewer competitors, the remaining companies could more easily survey and predict the landscape. But Sanderson's conference call suggested another source for the shift: Agri Stats, a private service that gathers data from poultry processors, produces confidential weekly reports, and disseminates them back to companies that pay for subscriptions.

Many industries, such as health care and retail, make use of information-sharing services, but Agri Stats provides chicken producers with a rare level of detail, in uncommonly timely fashion. The company's reports, portions of which *Bloomberg Businessweek* reviewed, contain exhaustive data about the internal operations of the nation's biggest poultry corporations, including bird sizes, product mixes, and financial returns at participating plants. According to a 2011 presentation prepared

by Agri Stats, the company gathers information from more than 95 percent of U.S. poultry processors.

Agri Stats has for years maintained that its reports don't violate antitrust laws, in part because the information provided is historical. A typical report doesn't say how much a company plans to charge for a cut of meat, only what it charged last month or last week. But historical data can be used to gauge future production levels, as Sanderson, who declined to comment for this story, demonstrated when he said he saw no evidence of a forthcoming ramp-up. He was referring to Agri Stats data showing the number of egg-laying hens, or pullets, that his competitors were placing on farms. This figure largely determines the number of eggs that will be laid and therefore how many chickens will be hatched and grown—a key marker of future production.

Last September, Lockridge Grindal Nauen, a law firm in Minneapolis, filed a class-action lawsuit against more than a dozen of the nation's largest chicken companies, alleging that they colluded to inflate prices from 2008 to 2016. The suit was filed on behalf of Maplevale Farms and other wholesalers, who claim that the price they were paying for chicken was inflated by an illegal, if tacit, agreement among the big companies. Agri Stats, the suit says, "acted as an agent and/or co-conspirator" of the defendants, serving as a kind of digital evolution of the proverbial smoke-filled rooms where collusive schemes are said to be hatched and orchestrated. If successful, the suit could cost chicken companies billions of dollars in damages; they've filed a joint motion to dismiss. A separate lawsuit filed last year builds on the Maplevale case, making the same allegations of collusion but expanding the pool of plaintiffs to retail purchasers of poultry—meaning the 95 percent of Americans who eat chicken.

The U.S. Department of Justice, which is chiefly responsible for antitrust oversight, doesn't appear to have taken any significant price-fixing actions against Agri Stats. But on Feb. 6, Tyson Foods revealed that it was cooperating with a subpoena by the U.S. Securities and Exchange Commission. Some media coverage of the announcement speculated that it might relate to the Georgia Dock Index, an obscure price-setting mechanism, but Tyson said the investigation had likely been sparked by the Maplevale lawsuit, which alleges a central role for Agri Stats.

In keeping with its insider business model, Agri Stats seems to relish its low profile. The company's bland and thinly detailed website says, beneath an image of a red barn in a cornfield, that it was founded in 1985, "on a kitchen table in the USA's heartland," by a man named Jim Cox. This down-home picture wouldn't lead most people to imagine a sophisticated agribusiness-to-agribusiness data company whose development coincided with, and helped spur, a revolution in the poultry industry.

Cox was born during the Great Depression, in the town of Essex, Mo. When he was 12 his father died, leaving a widow to raise five children. "We were very poor, OK?" Cox recalls. He developed a strong work ethic, paying his way through Purdue University by laboring for as many as 80 hours a week on a dairy farm. After college he sold feed and feed additives for an Indiana company called Central Soya, which entailed spending a lot of time driving around to service large poultry companies across the South.

Chicken had long been a pricey specialty meat, reserved for Sunday dinners, but in the postwar era, technology and a new generation of entrepreneurs was making it cheaper and more available. The traditional barnyard coops were replaced by automated warehouses, where chickens were hatched by the million. Scientists at the University of Arkansas and elsewhere bred

hyperproductive birds whose weight doubled on half the feed.

As Cox made sales, he collected information that helped him and his customers figure out which mixes of feed and additives helped birds add the most weight at the lowest cost. By the 1980s he'd persuaded his customers to fill out a standardized form that gathered key performance metrics. He didn't realize at first that this information might be more valuable than the feed itself. As he recalls, one of his customers approached him and said, "Well, you know, Jim, while you're getting that, why don't you just make a little comparison? Don't tell us who else is on the report or anything. Just make a comparison of the companies so that we can see how we're doing." Cox's first report was about 10 pages long. His clients loved it, and soon he was handing out reports with feed orders.

When Central Soya was purchased in 1985, Cox sat down at his home in Fort Wayne, Ind., and decided to start a business focused entirely on data. He hired his secretary away from Central Soya, and the two set up shop with a borrowed copy machine and data-sharing agreements from 16 companies. That April he incorporated Agri Tech Systems (later changing the name to Agri Stats). Then he hit the road and persuaded more poultry producers to join his network, developing methods to standardize their data sets until his monthly report ran to about 500 pages. With each new page, Agri Stats' value grew.

Cox's long history in the chicken business gave him an in with executives, who were a quintessential old-boy network. Many were Southern men who'd grown up in small towns during the Depression. If one of them trusted Cox, others tended to follow. "They're very, very competitive," he says. "At the same time, it's like a family when it comes to relying on one another."

As Agri Stats expanded, chicken was moving from the era of drumsticks to the era of McNuggets, overtaking beef and pork to become America's staple meat. Chicken carcasses were being divided and subdivided into a complex map of economic opportunity: The breast meat was worth so many cents per pound, the thigh meat far fewer; the value of livers fluctuated wildly.

During the 1990s, Tyson became the world's largest poultry producer in part by embracing data. Sensing an opportunity, Cox pitched Tyson senior executive David Purtle on his service. Purtle leveraged his company's market position, striking a deal for an Agri Stats subscription, he recalls, "where I didn't have to pay as much as everybody else." Cox confirms this but adds, "I came back to him about a year later, and he anted up some more." Whatever the price, it was worth it: Tyson added rich data on a significant number of plants to Agri Stats' reports, making them a de facto industry standard.

Cox kept at it for another decade and a half before retiring in the mid-2000s. In 2013, according to SEC filings, Eli Lilly purchased Agri Stats for an undisclosed sum and folded it into its farm animal drug division. Today, at Agri Stats' headquarters in Fort Wayne, dozens of software engineers, data specialists, and marketing managers oversee one of the largest private storehouses of information ever compiled about a single sector of the agricultural economy. According to Cox, clients submit their sales invoices in real time—when someone sells a truck of chicken to the Kroger grocery chain, for example, the invoice goes to Agri Stats soon after. He says

the company tracks and stores data on the health and profitability of 22 million chickens every day.

This data trove is remarkable not only for its size but also for the secrecy with which it's kept. The U.S. Department of Agriculture publishes reams of statistics on the hog and cattle businesses, which is of great value to farmers and commodities traders. But the USDA isn't so prolific with the chicken business because it's so tightly integrated, with companies such as Tyson owning the birds and the feed, thus leaving fewer commercial exchanges during which the government can gather data. Instead, what is almost certainly the world's largest repository of chicken business data sits on servers belonging to Agri Stats—for the benefit of its customers and, in rare cases, academics and industry groups who gain limited access for research purposes.

C. Robert Taylor, a professor of agricultural economics at Auburn University, has been an expert witness in many cases against big meatpackers, and over the years he'd heard rumors of a secretive poultry industry information-sharing service. But when attorneys provided him with a copy of an Agri Stats report for a case, he says, "I was shocked at the incredible detail." His next thought, he adds, was that if it were public, it would be a gold mine for researchers.

Taylor couldn't discuss the contents of Agri Stats' reports, citing legal confidentiality rules, but a review by *Bloomberg Businessweek* of a report produced in 2014 confirms that the documents offer extraordinarily detailed information. One page shows an extensive revenue breakdown for 33 poultry

plants, covering granular data in a number of areas, including product mixes—something most companies would characterize as proprietary. At the first plant listed—identified as "52" (only the company that has paid for the report sees its plants identified in an immediately recognizable way)—24.3 percent of its chicken was sold as deboned breast,

5.8 percent as wings, and 16.4 percent as whole leg.

Perhaps more important, the table shows which product mixes yielded the highest prices per pound. Plant 52's deboned breasts fetched an effective sales value of 84.51¢ per pound, whereas Plant 53 sold 31.2 percent of its mix as deboned breast and received only 77.27¢ per pound. Plant 53 also processed a much larger bird, which affects the overall value of the products sold. Executives with access to the report could learn, too, that a rival made more money the previous month selling breast meat than wings, which could help them anticipate what the competitor might do next month as well.

Another page reveals an invaluable industry metric, one that poultry companies experiment with obsessively in search of a competitive edge: the caloric breakdown of the feed used in each plant. Plant 52 was using a feed mix with a calorie count of 2,401, while Plant 89 was using feed with 2,889 calories. Using these figures, a company could push its count closer to a competitor's, in search of higher profits per bird.

Cox, Purtle, and others in the industry argue that such benchmarks make the industry more efficient on the whole. "If Agri Stats did anything," Purtle says, "it got people focused on their numbers and trying to do better."

Armed with Agri Stats data, the biggest chicken producers have been enjoying an unprecedented era of stability

*"You don't have a problem. As long as
you talk about history, you're OK"*

and profitability. At Tyson, operating margins in the chicken division have risen sharply since 2009, when they were 1.6 percent, according to SEC filings. The next year they were up to 5.2 percent. After a brief dip, they climbed to 7.9 percent in 2014, an astounding 12 percent in 2015, and 11.9 percent in 2016. A similar trend has been under way at Pilgrim's Pride, where operating margins went from 3.08 percent in 2012 to 14.02 percent in 2014 and 12.77 percent in 2015, according to data compiled by Bloomberg. The recovery from recession accounts for some of the gains, but the poultry industry's profit margins still have been abnormally fat and long-lasting by historical standards.

Accusations of collusion have dogged chicken companies for decades, but they've taken on new momentum in recent years, as three producers have come to control almost half of the U.S. market. According to Tyson's most recent industry fact book for investors, which covers the 2013 fiscal year, Tyson and Pilgrim's Pride account for roughly 40 percent of the market, while Sanderson accounts for 7 percent. These companies achieved their market positions partly as a result of the 1980s and 1990s merger wave, but also by integrating their operations. Tyson owns and controls its own hatcheries, feed mills, slaughterhouses, and trucking lines. Nominally independent farmers raise the birds under strict contracts, whose conditions the company sets.

Although this integration has made chicken cheaper and more plentiful, it also makes it easier for companies to implement production cuts. Because the life span of an eating chicken is so short—about six weeks in most cases—the big producers can quickly throttle back production by reducing the number of eggs their birds hatch when markets look weak. In the face of lower demand following the financial crash, executives openly discussed cutting back supplies. There's nothing untoward about that, as long as they don't coordinate cutbacks. Illegal collusion occurs when companies plan with one another to cut production ahead of time with the specific intent of raising prices.

The lawsuit filed by Lockridge Grindal Nauen on behalf of Maplevale Farms and other wholesalers names more than a dozen companies, including Tyson Foods, Pilgrim's Pride, and Sanderson Farms. The financial stakes are enormous: Plaintiffs who prove their antitrust claims can recover damages equal to three times the harm caused by the collusion. The Maplevale lawsuit alleges that a price-fixing scheme took place across eight years, starting in 2008, and estimates that the wholesale chicken market during that period was worth at least \$21 billion annually. So if the plaintiffs can prove that poultry companies colluded to raise prices by, say, 5 percent annually over eight years, they could win \$24 billion in damages. (The suit doesn't specify how much prices were allegedly inflated; technical facts such as these are usually established by economic experts at trial.)

The lengthy motion the defendants filed in late January seeking to dismiss the suit calls the collusion accusations a "conspiracy theory." Pilgrim's Pride and Sanderson Farms declined to comment for this story; Tyson disputes the allegations and says it will defend itself in court. "As noted in our motion," the company wrote in a statement, "the plaintiff's conspiracy claim is implausible since chicken production grew during the time when the plaintiffs claim the poultry companies were conspiring to lower output. In addition, USDA data shows broiler chicken

prices during the time cited by the plaintiffs were often lower than when [the] conspiracy allegedly began."


The filing doesn't discuss Agri Stats in detail, but it points out that the company has been active for decades, while the collusion was alleged to have started around 2008. Eli Lilly declined to answer a detailed list of questions about Agri Stats and the antitrust litigation. Cox disputes the idea that Agri Stats' business model enables collusion and says he consulted with an antitrust attorney in New York when he was developing the concept as an employee of Central Soya. "It didn't take him but about three seconds to say, 'You don't have a problem. As long as you talk about history, you're OK,'" Cox recalls. "So I just took it on that premise, from Soya, that we were OK, too. And we have been challenged on that. Always won." He declines to discuss further the legal challenges to the company, save

"You make sure that your co-conspirators have the kind of information that gives them confidence"

to emphasize that the reports maintain the anonymity of participating plants.

Peter Carstensen, a law professor at the University of Wisconsin and former Justice Department antitrust lawyer who has studied Agri Stats while researching the modern poultry industry, casts the level of plant-by-plant detail in the company's reports as "unusual." He explains that information-sharing services in other industries tend to deal in averaged-out aggregated data—for example, insurance rates in a given state. Such services run afoul of antitrust law, he says, when





they offer projections or provide data so detailed that no competitor would reasonably share it with another. Getting detailed information is a particularly useful form of collusion, Carstensen says, because it allows co-conspirators to make sure they're all following through on the agreement. "This is one of the ways you do it. You make sure that your co-conspirators have the kind of information that gives them confidence—so they can trust you, that you're not cheating on them," he says. "That is what creates stability for a cartel."

Whereas Cox and others argue that the anonymity of Agri Stats' information mitigates this concern, lawyers in the Maplevale case assert that poultry companies can reverse-engineer the data, thanks in part to a special monthly document Agri Stats produces called the *Bottom Line Report*, which breaks down key metrics, such as interest expenses, on a single row. The lawyers say it's relatively easy to match this anonymous data against numbers found in publicly available records.

Agri Stats and its president, Brian Snyder, declined to grant an interview or provide basic facts such as its annual revenue—information Eli Lilly also keeps out of its public filings and earnings statements. "We view our operations and strategy as confidential and proprietary information and not appropriate to discuss in a public forum," Snyder wrote in an e-mail. He referred questions to the company's website, with its scant detail and bucolic photography.

In the weeks after the Maplevale suit was filed, nobody paid it much attention. Then, on Oct. 7, a veteran stock analyst named Timothy Ramey of Pivotal Research Group downgraded shares of Tyson from "buy" to "sell" and slashed his valuation of the company's shares. The downgrade note was perhaps unique in the antiseptic genre of analyst reports, in that it read more like a petition for divorce than a simple recommendation change. After professing deep admiration for Tyson Foods CEO Donnie Smith, Ramey wrote that the evidence Tyson and others had included using

Agri Stats was "chilling." There was no simpler explanation, he wrote, for the post-2009 "perfect harmony" of industry production that had delivered record profit margins for Tyson.

Prior to the note, Ramey had often written admiringly of Tyson and Smith. He says he considers Smith a friend—he's even had him over for dinner—and one of the five best CEOs he's researched in his three decades covering the food business. But as the industry's boom proceeded, Ramey grew perplexed. "When you start getting 12 percent and 13 percent EBIT margins—when the returns on capital are just incredible in the business—then you just have to start to scratch your head and say, 'How come this isn't behaving like every other cycle in history?'" he says. The Maplevale complaint, he adds, "sort of sent shivers down my spine. I said, 'I don't know if this is right or wrong, but it definitely explains a lot about the last eight years if it is right.'"

Ramey acknowledges that other factors could be in play, including the Georgia Dock Index, a wholesale price index that poultry companies use to set prices. That index, which is based on industry self-reports, gained notoriety late last year when public records were released showing that the Georgia state employee who compiled it had told his bosses he feared poultry companies were giving him inaccurate numbers. (Some dubbed the episode "chicken Libor," in reference to a scandal involving manipulation of an exchange rate set in London for interbank loans.) The price was suspended briefly, but it has since been reworked and relaunched.

The Georgia Dock price is a concern, Ramey says, but it's exceedingly unlikely it could account for recent trends on its own. He points out that only a small share of Tyson's chicken prices are even based on the index and that, absent production cuts, oversupply of chicken would swamp any price-rigging based on a single index. (Ramey also notes, regarding Tyson's assertions that chicken prices have often been lower since 2008, that feed prices have gotten far lower.)

The same day Ramey's note was released, Tyson issued a statement disputing "the speculative conclusions reached by the analyst" and saying it would defend itself in court against the Maplevale case. Nevertheless, its stock fell about 9 percent that day. No other major analysts appear to have followed suit by downgrading Tyson to "sell," but the company's stock is down 12 percent since Ramey's note, in part also because Smith stepped down as CEO in late November, at age 57. (Tyson declined to comment on Smith's departure but has said elsewhere that it was unrelated to pending litigation.)

The Maplevale lawsuit is still in its early stages and could take years to resolve. The plaintiffs have until March 15 to respond to the motion to dismiss. In the meantime, a hearing set for Feb. 24 could determine if they're able to begin full discovery, which would give them access to sensitive documents, such as internal communications and Agri Stats reports, that could reveal whether the companies used Agri Stats to help coordinate strategic production cuts.

Meanwhile, Agri Stats continues to expand its business. The company has opened operations in Brazil to take advantage of growth by U.S. poultry companies there. It has also been branching out into the hog business, which has, over the past 30 years, started to look more and more like the chicken industry, with hogs being raised under contract for vertically integrated companies such as Smithfield Foods. It appears that demand for the service is strong. At a hog industry trade show in 2011, an Agri Stats employee pitched the company's services. His slideshow indicated that 27 companies had already signed up. **E**

TECHIE'S W
TECHIE MUR
TECHIE STA
TECHIE INJ

The Killer Wrote Code

LIFE MURDERER KIDNAPER ACCUSED KIDNAPER'S WIFE 11 KIDNAPERS 24 IN S

Why is India obsessed with tech industry crime? By Ben Crair

Prachi Das was murdered on a Monday. The killer, a friend of her husband's named Basudev Jena, showed up at her apartment in Bangalore on March 2, 2015, in hopes she would help him with his debts. Jena hadn't meant to hurt Das, he later told the police, but he lost his temper when she refused to lend him money. He tried to tear away her necklace, and when Das screamed he cut her throat. The landlady stopped him in the hallway as he tried to flee, his shirt stained with blood.

In India, print newspapers thrive as if it were 1995. They're numerous and energetic, and they rush to the scene of a good story. Das's murder was a sensation, and each publication did what it could to distinguish its coverage. The *Indian Express* dwelt on the meaning of a carton of ice cream found melting near her body, and the *Times of India* floated an alternate theory of the crime, speculating that Das had screamed because she saw a rat, leading Jena to panic. But all the papers agreed on the overriding importance of a single, seemingly inconsequential detail: Both Jena and Das's husband were software engineers. Or, as the profession is known in India, they were techies.

When I visited the city in September, the Bangaloreans I met fondly recounted their favorite techie stories from the local press. One involved a couple whose nanny secretly rented out their baby to street beggars. Another featured a software engineer who pretended to be an astrologer to trick his wife into confessing infidelity, then bludgeoned her to death with a religious idol and, for good measure, called in bomb threats to the airport pretending to be the husband of an ex-girlfriend with whom he hoped to get back together.

Reddit users recently observed that the "Indian techie" has become like the "Florida man" meme in America: an archetype of incompetent criminality and hapless violence. But in India, the techie is also celebrated as a symbol of the country's ascendancy in the global economy. "In a society where there are no heroes, techies are the only heroes," said Mohandas Pai, a venture capitalist, in his corner office on the top floor of a building near Bangalore's central park. "A techie is a person you look up to with great respect," he said, adding that the media's sordid stories "are just sensationalizing."

Even if that's true, the coverage resonates with readers. The resentment implicit in techie headlines occasionally spills over into actual violence. On Sept. 12, riots broke out across

The resentment implicit occasionally spills over

"TECHIE'S WIFE MURDERED" read the headlines in both the *Hindu* and the *Bangalore Mirror*. "TECHIE STABS FRIEND'S WIFE TO DEATH" ran in the *Deccan Herald*. To read the Indian newspapers regularly is to believe the software engineer is the country's most cursed figure. Almost every edition carries a gruesome story involving a techie accused of homicide, rape, burglary, blackmail, assault, injury, suicide, or another crime. When techies are the victims, it's just as newsworthy. The *Times of India*, the country's largest English-language paper, has carried "TECHIE DIES IN FREAK ACCIDENT" and "MAN HELD FOR PUSHING TECHIE FROM TRAIN"; in the *Hindu*, readers found "TEACHER CHOPS OFF FINGERS OF TECHIE HUSBAND" and "TECHIE DIED AFTER BEING FORCE-FED CYANIDE." A long-standing journalistic adage says, "If it bleeds, it leads." In India, if it codes, it explodes.

The epicenter of techie tragedy is Bangalore, a city in the southern state of Karnataka that bills itself as India's Silicon Valley. Bangalore has more startups than any other city in the country and is home to Apple, Google, IBM, Intel, Microsoft, and Oracle, in addition to big domestic information technology companies such as Infosys and Wipro. More than 10 percent of Bangalore's 10.5 million residents work in tech, giving journalists plenty of unfortunate events to sensationalize: "ASSAULT OVER BANANA SPLIT: 3 TECHIES HELD"; "DEPRESSED BANGALORE TECHIE INJURES 24 IN SWORD ATTACK SPREE."

Bangalore after a court ordered Karnataka to share water with a neighboring state. Thirsty mobs targeted the well-kept Oracle office, which had to be evacuated, as well as eight Infosys employee buses, whose passengers were forced to walk home under a hail of stones.

Technology was supposed to deliver India from poverty, but in Bangalore it's also deepened the division between rich and poor, young and old, modern and traditional. As the city has grown richer, it's also become unruly and unfamiliar. If the tech worker is the star of the Indian economy, then the techie is his shadow—spoiled, untrustworthy, adulterous, depressed, and sometimes just plain senseless. ("TECHIE WITH EARPHONES RUN OVER BY TRAIN.") In one occupational boogeyman, Bangaloreans can see their future and their fears.

Hundred Feet Road runs through Indiranagar, a once-quiet neighborhood that's now the center of the Bangalore tech scene. It feels as if someone diverted a highway through a shopping mall. Shops and restaurants crowd the sidewalks like spectators at a parade, and rooftop pubs crank their music to drown the clamor from the street. People complain that Bangalore's traffic is the worst in India, and the eight lanes of Hundred Feet Road often come to a standstill as drivers, trying to get somewhere as quickly as possible, make it impossible for anyone

to get anywhere at all. Only the cows, headed nowhere, enjoy the right of way.

Across from an Adidas shop, Chiranjiv Singh, the former development commissioner of Karnataka state, lives in a small but verdant plot—a sliver of the wilderness he found when he moved there 40 years ago. The land was a coconut grove then, and a few tall trees still lend his home their shade. The birds and monkeys have stopped visiting, though, and Singh, a soft-spoken Sikh with a long and coarse beard, expects he will leave soon, too: “I don’t know how long we can continue here because of all this noise.”

Bangalore used to be known as the Garden City. It was a medium-size, middle-class metropolis in one of the few areas of India that didn’t broil in summertime. Colonial bungalows nestled among flower beds, old trees, and pristine lakes. “I have discussed the subject of Bangalore with persons in other parts of India and have found that 90 out of a hundred dream of settling down in Bangalore, after retirement,” the novelist R.K. Narayan wrote in 1977. Another nickname for the city was the Pensioner’s Paradise.

Bangalore’s makeover began in the 1980s. Previously a center of textiles, aerospace, and electronics, the city became an

Bangalore gridlock:
Natives bitterly
complain about the
role of techies in
crippling the city’s
infrastructure



cit in techie headlines er into actual violence

71

outsourcing hub as undersea fiber-optic cables made it possible for U.S. and European corporations to offshore IT work. Texas Instruments opened a software-design center there in 1985; Infosys, an omnibus software and services provider, went public in 1993; and three years later a local coder invented Hotmail. By the turn of the century, Bangalore had established a reputation for coding quality software at low cost, and corporations hired the city’s engineers en masse to guard their systems against the Y2K bug. Bangalore inspired Thomas Friedman’s 2005 best-seller on globalization, *The World Is Flat*.

From 1981 to 2001, Bangalore doubled its population, to 5.7 million. The invaders had a name. “We had a new occupational category emerge: the IT engineer,” said Balaji Parthasarathy, a professor at the International Institute of Information Technology in Bangalore. IT engineers brought a lot of benefits. Real income grew much faster in Bangalore than in other parts of India, and the city became

the country’s main link to the economies of the West. “We have more connections with Silicon Valley than with Delhi,” said Pai. “Bangalore is India’s only global city.”

But the IT engineers lived differently from the pensioners and other longtime residents. They spoke English, not the native Kannada, and lived in gated condominium towers with pools and fitness clubs rather than in traditional bungalows. They worked in amenity-rich office parks, shopped in designer malls, ate at Western chain restaurants, and socialized in posh microbreweries. And their strange habits were chronicled by the booming local press.

The word “techie” first appeared in newspaper headlines in the 1990s simply because it was shorter than “software engineer.” Readers loved the stories, and editors soon went out of their way to assign them. “The news value of anything to do with a techie seems to be more,” said B. Pradeep Nair, the news editor of the *Hindu*, in his office, as that day’s edition was being put to bed. Media consultant Imran Qureshi recalled a story he covered 15 years ago about a married couple in

TECHIE STABS WIFE 11 TIMES FOR REFUSING TO SIGN HOME LOAN FORM

Chennai Infosys staffer hacked to death at rly station

Infosys to pay \$1 ex gratia to family of murdered techie

25 held in Pune techie murder

Rasika Raju, 27, was killed on Pune's Infosys campus

Cops issue safety norms to IT firms after techie's death

Chennai who were producing child pornography. That in itself wasn't scandalous enough to make the story a sensation. "It became a headline story because the man happened to be an IT professional," Qureshi said.

Today, Indian journalists apply the word "techie" to anyone remotely connected to the IT industry. Some headlines imply that techies are more important than other people, such as "TECHIE AMONG THREE BURNT ALIVE IN GARUDA BUS MISHAP." Other stories tell of incidents so minor they seem to exist only so the journalist can use the word. The *Herald* recently reported on a techie who had stepped on a "brittle footpath slab" and suffered "swelling in his leg."

The close scrutiny makes the techie seem alien, like a strange specimen in a cage. "When we use 'techie,' it is a bit of a local-vs.-outsider thing," said Ravi Joshi, editor of the *Bangalore Mirror*, in his newsroom. "It is basically the profession that does not belong here."

One afternoon in Bangalore, my Uber driver, Chethan J., invited me to join him in the front seat of the car. (Many Indians use a single name, or mononym, sometimes with an initial.) We were in the center lane of one of the city's busiest roads, which meant, of course, that we weren't moving. Chethan is 22, with thick black hair and a mustache grown long at the tips. Thinking to myself, When in Bangalore, do as Thomas Friedman does, I asked him for a driver's-eye view of tech workers. Chethan's mood darkened. "They are coming and destroying our culture," he said. Industry boosters are fond of saying that each tech job creates anywhere from 3 to 10 support jobs in the city, but Chethan had no affection for the engineers he ferried around all day. He has a bachelor's degree in political science and economics and joined Uber only when he couldn't find a better-paying job. "The locals are servants," he said. "All of Bangalore is going bad."

The tech boom that was supposed to profit the city has made daily life harder. Bangalore's population has doubled again since 2000, buckling the local infrastructure. There are more than 6 million vehicles, and the average driving speed in the city center is below 6 miles per hour, meaning it would be faster for everyone to jog slowly than to drive. During the initial IT boom, the portion of Bangalore's population living in slums doubled. Blackouts became daily occurrences, and road-widening projects destroyed parks and trees without decongesting the streets. Money flooded in, but the lakes dried up—of the 900 the city once counted, fewer than 200 are still considered "live," and most of those are filled with sewage. In October, thousands

protested in the streets over plans to build a multibillion-dollar elevated bypass connecting the Bangalore airport to the city center. Demonstrators argued the project would benefit the jet-setting elite but do little to help poorer residents who spend hours every day in gridlock.

Frustration was palpable all over Bangalore. A kindly older man named Vijay Thiruvady, who leads tours of the botanical gardens and Cubbon Park, the city's largest remaining green spaces, rued the failure of the IT industry and government to coordinate the growth. "The tech boom has completely changed the city. They've ruined it," he said, as we sat in yet another traffic jam. "I'm going to use a strong term," he warned, before cursing another motorist as "a stupid fellow." Then he resumed grousing about techies.

"With the coming of the techies, you can see the traffic, you can see the road rage, you can see the problems with infrastructure, you can see trees being cut everywhere," said Narayanan Krishnaswami, a reporter with the *Times of India*. "For a lot of people, that is a repudiation of what the city used to be. And they trace it back to the cause of the prosperity, which is the tech sector."

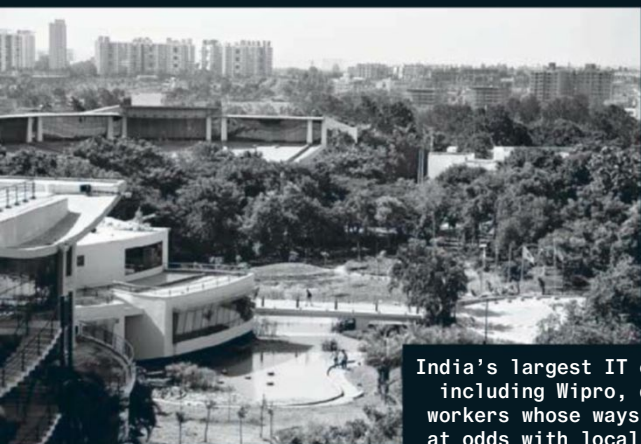
One of the main appeals of the newspapers' techie coverage is schadenfreude. "When a techie falls, everyone is secretly happy," said Joshi, the *Mirror* editor. Techies arriving from across India are assumed to be more interested in the Western lifestyles of the modern workplace than the local culture of their new city. They tend to live away from their parents, drink alcohol, spend money freely, travel abroad, keep strange hours (because they work on the schedules of U.S. and European clients), and choose "love marriages" over traditional arranged ones.

Someone who suspects tech workers of immorality would find plenty of grist in the newspapers, where techies are frequently killing their spouses and having affairs. Such stories sometimes implicate the victim in his fate. An article might note, for example, that the parents of a woman whose techie husband killed her had disapproved of the marriage, or that a techie killed himself after a "trivial" argument with his wife.

Taken together, the stories can read like morality plays. They assuage a reader's envy by suggesting that a tech worker's material wealth conceals a deeper poverty. "If a techie can commit suicide or kill his own wife," said Sahana Udupa, a social anthropologist who previously worked as a journalist in Bangalore, "it says something about the stress, something about the depression, something about their loose morals."

I thought it unlikely that tech workers were genuinely troublesome, so I visited the Bangalore police headquarters to ask for an official perspective. Bureaucracies in India like to unfurl themselves before visitors, and the police commissioner on the first floor referred me to an additional police commissioner down the hall, who referred me to a deputy police commissioner on the fifth floor, who was so thrilled by my visit that he paused our interview midway to take my photo with his phone. His name was M.G. Nagendra Kumar, and a few years earlier he had studied crimes involving software engineers. He concluded that the techie "lacked the general thinking of other common people," he told me. "His mind works like a computer machine."

Kumar said the techie's long hours in front of a PC could make him dangerously impatient: "He wants life to go at internet speed." At a busy intersection, a techie wouldn't wait for the signal. "Only techies are the deceased in road accident cases," Kumar said. And at home, a techie might grow angry and violent with a wife or family member who didn't follow commands automatically like his computer. At this point, a



India's largest IT companies, including Wipro, draw young workers whose ways are often at odds with local tradition

“They’re always before the system. It makes them behave like a beast, almost”

police inspector named Kanakalakshmi (also a mononym), who’d been sitting quietly beside me in Kumar’s office, spoke up. “They’re always before the system,” she said. “It makes them behave like a beast, almost.”

Kanakalakshmi produced two spreadsheets. The first listed 139 cases since 2010 in which a software engineer had been accused of a crime; the second listed 297 cases, excluding petty thefts, in which a software engineer had filed a complaint. Neither sum really suggested a crime wave in a city with more than 1 million tech workers, and it was hard to make sense of the statistics. The translation from Kannada to English had rendered many case descriptions unintelligible, and the spreadsheets seemed to exclude certain cases I’d read about in the papers while listing others twice.

It was nevertheless interesting that the most common complaint by far was a spouse alleging mental and physical harassment (in some cases, the police use the word “torture”), often in connection to a dowry dispute. The clash between the traditional expectations of Indian culture and the demands of modern professional lives doesn’t only shape the relationship between techies and the rest of the city, it also plays out in tech workers’ private lives. “Social liberalization hasn’t kept pace with economic liberalization,” said Asha Rai, a senior editor at the *Times of India*. “The values they imbibe at the workplace and when they travel are in conflict when they come home.”

I wasn’t attacked by sword, pushed from a train, force-fed cyanide, tortured, or otherwise harmed by any of the techies I met in Bangalore. I was introduced to coders, startup founders, investors, and engineers, including a group that was building a moon lander for Google’s Lunar X Prize competition. A robotics specialist from IBM named Aswin Subramanian gave me a tour of Whitefield, a tech district, in his race car and then invited me to his home, where he played Yanni songs on a keyboard. (OK, perhaps there was some torture.)

Techies in Bangalore extol a strain of utopianism similar to that found in Silicon Valley. “Eventually everything will be solved by tech,” said Mukund Jha, the co-founder of Dunzo, a concierge app that lets users hire a runner to carry out almost any task for

a few dozen rupees—less than a dollar. At the moment, a Dunzo runner was fetching him a coffee from Starbucks; he’d also used the service to repair the cracked screen of his iPhone and install pigeon nets on his balcony at home. Customers have used Dunzo to retrieve lost phone chargers, deliver birthday cakes, purchase toilet paper, and check whether a shop is open. “Once you get started, you get hooked to it,” Jha said. “On a good day, you can get anything you want within 10 minutes.”

Dunzo is incredibly useful in a city where completing simple tasks grows harder by the day. But the app also indicates how technology further cocoons the privileged from the rest of the city. Dunzo’s founders say they hope their app will trickle down to the masses, but they’ve targeted early builds at the elite. “We haven’t seen a single request which is non-English,” Jha said.

Although tech has offered millions of young Indians a ladder out of poverty, there’s also concern that it will soon eliminate jobs instead of creating them. At IBM, Subramanian was designing robots for use in automation. (He recently left the company.) Dunzo is working to build artificial intelligence that would eventually replace much of its operations staff. Wipro and Infosys, the IT companies that most symbolize Bangalore’s tech industry, replaced 8,200 human jobs last summer with software. Tej Pochiraju, the managing director of Jaaga Startup, which bills itself as India’s first co-working space, said the divide between engineers and laymen would only accelerate. “As things get more and more automated, technology and techies will become more godlike,” he said.

In a New Year’s letter to his employees, Infosys Chief Executive Officer Vishal Sikka wrote of “the tidal wave of automation and technology-fueled transformation that is almost upon us”—a choice of words that sounded more apocalyptic than utopian. A few weeks later a techie was murdered by a security guard on Infosys’s campus in Pune, about 500 miles northwest of Bangalore. The *Hindustan Times* warned about “a growing list of IT workers kidnapped, molested, raped, or killed on campus.” Although unrelated, Sikka’s letter and the crime coverage shared a certain anxiety: Tech could guarantee neither job security nor personal safety. The techie, the hero of the Indian economy, would never be as safe as he seemed. **B**

A ·-
 B -...
 C -...
 D -..
 E ·
 F ·...
 G -..
 H
 I ..
 J -...
 K -...
 L -...
 M --
 N -..
 O -...
 P -...
 Q -...
 R -..
 S ...
 T -
 U ·-
 V ...-
 W -...
 X -...
 Y -...
 Z -...

-... L - - - - - - - - - - -... · · -... -...
 - - - - - - - - - - F · - - - - - - - - - - - -

Decipher breaking news.

Piecing together the latest updates from the business and financial world just got easier. Bloomberg Gadfly journalists take an unorthodox stance on breaking news to deliver concise, provocative commentary. And they're backed up by a treasure trove of data and analytics that only Bloomberg can provide. When it comes to providing the smartest and most opinionated commentary, we've cracked it.

bloomberg.com/gadfly

ARE YOU BEING WATCHED AT
WORK?

STOP WITH THE PODCASTS

COZY
CUBICLES

GET SKIN THAT
GLOWS

ETC

TO BOLDLY
CRUISE WHERE
NO COUPLE
HAS CRUISED
BEFORE

SUPERFANS TAKE TO THE HIGH SEAS
BY FRAN GOLDEN
PHOTOGRAPHS BY EVA O'LEARY



In her left upper arm, Allison Holmes has a tattoo of an octopus with pointy Vulcan ears wrapping its tentacles around a spaceship that resembles an elongated VW camper. The “Spocktopus” is a tribute to Leonard Nimoy, who played the half-Vulcan, half-human Mr. Spock on the original *Star Trek* television series. “It was inspired by old science fiction posters,” says Holmes, 33, of San Antonio. Holmes is a self-described Trekkie, though that probably goes without saying if you’re showing off Spock-inspired body art. Especially if you’re showing it off in a hot tub aboard the *Norwegian Pearl* as it sails through the Western Caribbean on the first-ever *Star Trek: The Cruise*.

Joining Holmes in January were Trekkies from as far away as Australia and New Zealand, their suitcases full of costumes and body paint. Shorts and bathing suits were the favored daywear, but at night fans emerged from their cabins dressed as Vulcans, fierce-looking Klingons, antennae blue Andorians, and green Orions. There were also several reptilian Gorn and Yeoman Rand look-alikes with beehive hairdos. Didn’t get any of these references? Then this cruise was definitely not for you.

You might not think of wannabe Klingons as people who leave their parents’ basements much, let alone as sun-and-fun types. But superfans such as Holmes make up one of the newest and most enthusiastic groups hitting the high seas. Music themes have dominated the industry for years, but cruises are increasingly embracing other forms of pop culture. In addition to the *Star Trek* trip, fans are filling ships for shows including *The Walking Dead* and *Property Brothers*, where the Scott brothers held Q&A sessions about design, signed autographs, and sang karaoke. Oprah is going to attend an *O, The Oprah Magazine* cruise to Alaska in July, and the publication, with partner Holland America line, is running four additional theme cruises this fall and next year. “There is a tremendous

sense of camaraderie” on these cruises, says Howard Moses, a travel agent who also runs the website Theme Cruise Finder. “It’s nice to know that people you meet at dinner share your passion.”

It’s also nice for the cruise lines, which see themed events as a way to draw new clientele. Third-party production companies book entire ships, usually during what would otherwise be cruising’s fallow season; fans care more about the what of the experience than the when or where.



And they’re willing to spend. The average fare paid by the 2,300 passengers on the six-day *Star Trek* cruise was \$2,400 per person, more than double Norwegian Cruise Line’s typical January rate.

Since the first theme cruises set sail about 30 years ago, they’ve become a bigger and bigger part of the industry. Moses’ site recorded 150 in 2012. Today there are 600-plus listings. Included are small group gatherings and shipwide

“THE PURPOSE OF A THEME CRUISE IS ORANGE JUICE CONCENTRATE. WE ARE PROVIDING FANS WITH A CHANCE TO EXPERIENCE THEIR PASSION IN THE MOST INTENSE POSSIBLE WAY”

takeovers. Music and superfan charters have become such an attractive business that in 2012 Norwegian bought Sixthman, a production company in Atlanta that began staging Festivals at Sea each year; the 2017 lineup includes cruises featuring Pitbull, Kid Rock, Kiss, acts from the Warped Tour, outlaw country musicians, and the funny men of the TruTV show *Impractical Jokers*. “The purpose of a theme cruise is orange juice concentrate,” says Michael Lazaroff, executive director of Entertainment Cruise Productions and the mastermind behind the *Star Trek* voyage. “We are providing fans with a chance to experience their passion in the most intense possible way.”

Lazaroff and his team started talking with CBS, owner of the *Star Trek* franchise, in the summer of 2015. As it happened, CBS had been looking for ways to celebrate the 50th anniversary of Gene Roddenberry’s creation, which went on the air in 1966. “We considered developing a *Star Trek* cruise for fans for some time, and the 50th anniversary seemed ideal,” says Veronica Hart, senior vice president for CBS’s consumer-products

division. She adds that the “stars aligned” when William Shatner, 85, Captain James T. Kirk in the original series, signed on to host. “He wasn’t cheap,” Lazaroff says.

That September, Lazaroff and his staff headed to the annual Las Vegas *Star Trek* convention to test fan reaction. “The website we had wasn’t ready to take reservations,” he says. Interest was overwhelming, and his team cobbled together an online sign-up. “We just threw it up, and next thing we knew—boom!—we were done.” The cruise sold out in three weeks, although many who booked had never attended a *Star Trek* convention, according to a precruise survey. Hart says the experiences aren’t mutually exclusive: “The cruise is a completely unique, immersive experience.”

The *Pearl* was tricked out with references to the shows—the original series, *Next Generation*, *Deep Space Nine*, *Voyager*, *Enterprise*, and *Discovery*, which is set to premiere this May—and films. Special signage transformed elevators into turbolifts. The ship’s specialty restaurants incorporated the names of characters into dishes such as Vic Fontaine’s chateaubriand, which was named for *Deep Space Nine*’s holographic lounge singer.

Programming included the Q&As and the autograph and photo sessions you’d find at a convention; autographs cost \$25 to \$35, depending on the actor, and photos were \$40. Klingon foreheads ran \$45. Shatner, whose contract mandated that he pose for one photo per cabin, joked to the crowd about how cute Chris Pine’s portrayal of Captain Kirk is in the latest *Star Trek* movies, talked physics and global warming, and attempted to answer fans’ requests for details about his experiences on set.

Passengers could also attend a no-fee yoga class hosted by Terry Farrell, aka Jadzia Dax, *Deep Space Nine*’s Starfleet science officer; play blackjack with Marina Sirtis, aka the half-human, half-Betazoid Deanna Troi on *Next Generation*; and attend a happy hour with Denise Crosby, aka Tasha Yar, briefly the *USS Enterprise*’s chief of security on *Next Generation*. Special actor-led shore excursions to Cozumel and the Bahamas, which cost \$75, up from the normal \$50, sold out before the ship set sail. A lecture by theoretical physicist Lawrence Krauss, author of *The Physics of Star Trek* (1995), drew a standing-room-only crowd. Former *Saturday Night Live* cast member Joe Piscopo, who guest-starred as a comic on an episode of *Next Generation*, got

multiple standing ovations for a nighttime set.

If the *Pearl* wasn’t quite a floating *Enterprise*—the crew didn’t wear Starfleet uniforms—there were constant references to “boldly going” and “warp speed.” The mood was friendly and accepting. “It’s nice to be among your people,” says Holmes of the Spocktopus. “You see a lot of cool costumes and a lot of people really, really geeking out.” Her parents were also on board, and she and her husband, Allen, 33, have already booked a penthouse for the first of two more *Star Trek* cruises that will take place next year, both hosted by George Takei, who played Sulu, the helmsman on Kirk’s *Enterprise*.

The cruisers knew their stuff. At a trivia contest with Max Grodénchik, who played Rom, a

large-eared Ferengi on *Deep Space Nine*, passengers rushed to call out answers to questions such as “In the ‘Enterprise Incident’ episode, the Romulan commander offers Spock what?” (Answer: “The Right of Statement.”) During a \$40 pub crawl with Robert O’Reilly, Gowron from *Deep Space Nine*, passengers showed off their Klingon language skills. One man pounded his feet as he sang the words to several Klingon battle songs. O’Reilly was impressed.

In one session, Rabbi ElizaBeth Beyer, 57, and husband Tom, 63, of Reno, Nev., renewed their wedding vows at a ceremony officiated by *Deep Space Nine*’s Farrell. Married 35 years and wearing Starfleet uniforms, they repeated vows written by Jordan Hoffman, host of *Engage: The Official Star Trek Podcast*. They referenced phasers and Tribbles and holodecks and, near the end, said, “You are the bridge to my *Enterprise*, you are the captain to my starship.” **B**





PODHELP ME

There are so many great podcasts! Ugh, there are so many great podcasts. By David Sax

Every morning, after I drop off my daughter at day care and prepare for the walk home, I take out my phone and stare at the unplayed podcasts. Do I continue with another episode of *Homecoming*, a scripted thriller about a war veteran, or catch up on global news analysis with Monocle's *Foreign Desk*? Would I rather laugh with the fictitious but all-too-believable Jewish grandmothers *Ronna & Beverly* or work through someone's unsettled past on Jonathan Goldstein's *Heavyweight*?

I scroll. I listen for a half-minute. And then I close the podcast app, open Spotify, and play some Bill Withers. I love podcasts, but I've got a case of podcast fatigue.

Podcasts only took hold in 2004; in the past few years, their numbers have exploded, largely because of the commercial success of hits such as *Serial*. Some are home-brew projects, and others

are churned out by well-funded networks including Earwolf and Gimlet Media. The pool of monthly listeners has almost doubled since 2013, to about 57 million, according to Edison Research.

Today, podcasts are high culture. They're part of that species of affluent-adult homework that's not only mandatory but also somehow more intellectually rigorous than listening to music or FM radio. I've never seen *The Wire* or *Breaking Bad*, and it took me about a year to finish the latest season of *Orange Is the New Black*, but now I'm supposed to feel guilty for missing each new must-listen podcast, too?

For an East Coast liberal like me, the question, "Did you hear that episode of *99% Invisible*?" carries the same peer pressure as "Did you read that article in the

New York Times?" The distance between my home and day care is 15 minutes, and I'm not inclined to take a job in the distant suburbs so I can listen to yet another slightly differentiated version of *This American Life* or one of the two dozen (!) podcasts that friends of mine host on such topics as urban affairs (*#UrbanizeThis*) and parental wisdom (*Advice From Mom*), with new episodes dropping once or—Ira Glass forbid—twice a week. I feel my cultural understanding slipping away with each skipped episode—or, at least, I feel as if that's what I'm supposed to feel. It's time to hit pause on this insanity.

My angst aside, there's good news here: The boom in listeners has translated to a spurt in ad spending. According to a report last year by Harvard's Nieman Journalism Lab, podcast advertising grew 48 percent in 2015 (thanks, Casper, Squarespace, and MailChimp), and it's expected to grow an average of 25 percent annually through 2020, when revenue will reach about a half-billion dollars. Erik Diehn, the chief executive officer of podcast advertising network Midroll Media, says, "There's rapid growth in not just the total number of podcasts, but the total number of high-quality podcasts." So you're not only missing podcasts. You're missing really good podcasts.

If it's any consolation, the podcasters providing our quality audio entertainment have the same FOMO, too. "I feel constant anxiety" about not keeping up, says Wailin Wong, co-producer and host of *The Distance*, a show about "longevity in business" by tech company Basecamp. "If I can only get to a fraction of what I want to listen to, what's it like for other people?" Jesse Brown, the creator of the media criticism podcast *Canadaland*, says it's not

our fault: "A big problem is that we ask listeners to do too much. Radio goes on or off. Podcasts ask you to do a lot, first in terms of discovery, and then, once you've done that, you feel all this pressure to keep up."

Or felt. I'm done trying. As Bill Withers sings, it's gonna be a lovely day, lovely day, lovely day. **B**

**I HAVEN'T EVEN
WATCHED
THE WIRE YET**

The Right Kind of Shine

"Dewy" skin is the hottest look, even when it's freezing out

By Aja Mangum



Master class

There's a fine line between dewy and sweaty. Lori Taylor-Davis, the global pro-lead makeup artist for Smashbox cosmetics, explains how to stay on the right side of clammy:

Keep hydrated. During the winter, fire up that humidifier. And always drink plenty of water, of course.

Know your skin type. If you're on the shiny side, skip facial oils. If you have dry skin, moisturize strategically to avoid flaky spots, which will turn makeup clumpy.

Stay centralized. Apply highlighter only to your cheekbones, the bridge of your nose, and your cupid's bow (the curve of your upper lip) to draw attention to your features.

Do the dew

Step 1*: Mist

Allies of Skin Molecular Saviour toner mist, \$79; alliesofskin.com
It takes a while to absorb, but once it does, this spritz, made with rose water and probiotics, delivers powerful hydration.



Step 2*: Moisturize

Shiseido White Lucent all-day brightener, \$60; shiseido.com
This lotion is made with light-reflecting pearl powder. And the broad-spectrum sunscreen (SPF 23) can't hurt.



Step 3*: Oil up

Lumene Sisü Recover & Protect facial oil, \$30; amazon.com
Made with oils extracted from Nordic berries, it goes on silky smooth to give a healthy sheen.



Step 4: Prime

Nars Radiance primer SPF 35, \$36; narscosmetics.com
A perfect base for foundation, this protective primer smells like cinnamon—in the best possible way.



Step 5: Smooth

Chanel Sublimage Le Teint ultimate radiance-generating cream foundation, \$135; chanel.com
Formulated with fine diamond powder—said to act the same as pearl powder—to help you look and feel like a million bucks.



Step 6: Conceal

IT Cosmetics Bye Bye under-eye illumination, \$24; sephora.com
This brightening reformulation of IT's popular foundation covers imperfections and won't crack, which would make skin look less dewy than dehydrated.



Step 7: Highlight

M.A.C. Strobe cream, \$33; maccosmetics.com
For anyone afraid of overdoing it, this liquid highlighter will give you a subtle glow.



Or try:

Dior Diorskin Nude Air Luminizer powder, \$56; dior.com
If you have oily skin, go for a light dusting.



**Do these at your discretion. Consider using a mist as a finishing spray to keep makeup in place, or apply an oil before bed and let it soften skin overnight.*

1 Curly fur bolster
by Quinn
\$165; quinnshop.com

2 Magnet pillow
by Block Shop
\$85, in linen or indigo;
blockshoptextiles.com

3 Bias pillow by CB2
\$60; cb2.com

4 Mountain pillow
by Minna
\$180; needsupply.com

5 Throw quilt No. 8
by Louise Gray
\$410; needsupply.com

6 Diagonals blanket by
Alexander Girard for Vitra
\$565; vitra.com

7 A Kook Milieu suede pillow
by Kelly Behun Studio
\$495; kellybehun.com

8 Graph New Zealand blanket
by Moonish for ZigZagZurich
\$200; zigzagzurich.com

9 Pyramid pillow
by Dana Haim
\$375; danahaim.com

10 The Square quilted throw
by Cold Picnic
\$230; coldpicnic.com

11 Mohair-wool-blend throw
by Aesthetic Content
\$88; ahalife.com

12 Jersey interknit
pillow by CB2
\$80; cb2.com

Great for breaking
up a pile of squares
or rectangles, the
pyramid shape nods
to Aztec architecture.

Artisans from
Teotitlán del Valle,
Mexico, hand-weave
the fabric.

Michelangelo Antonioni's 1975
film, *The Passenger*, shot in Spain
and Africa, inspired the colors of
this textile.

The two sisters who started Block Shop, a design studio in Los Angeles, work with a fifth-generation master printer in Bagru, India, to create textiles with a modern, Californian aesthetic.

The front is laser-etched,
art deco-patterned
suede; the back is linen.

Sit Back, Relax

A pillow or throw adds unexpected pop to an otherwise boring office—or a fort if you need to hide from your boss

By Monica Khemsurov

13 Mini Rasta cushion by Arcade Avec
\$175; abchome.com

14 Pastel color block cashmere blanket by Quinn
\$675; quinnshop.com

15 Integrate hand-woven throw by Cristian Zuzunaga
\$395; shophorne.com

16 Luxe velvet pillow cover by West Elm
\$49; westelm.com

17 Field Day cushion by Donna Wilson
\$110; shophorne.com

18 Moon pillow by Caroline Z Hurley
\$160; carolinezhurley.com

19 Purple Pod square pillow by Naomi Clark for Fort Makers
\$150; fortmakers.com

20 Black Onda throw by Arcade Avec
\$1,295; abchome.com

Serious dreadlocks?
A Hungarian sheepdog?
You decide.

SENSORY OVERLOAD

Is your office keeping an eye on you?

By Rebecca Greenfield

About a year ago, in a widely reported story, journalists at British newspaper the *Telegraph* found little black boxes installed under their desks. The devices, which had “OccupEye” emblazoned on them, detected if employees were at their workstations. Not shockingly, writers and editors were suspicious, worried that bosses were monitoring their moves, even their bathroom breaks. The National Union of Journalists complained to management about Big Brother-style surveillance. The company insisted the boxes were intended to reduce energy costs, ensuring that empty cubicles weren’t overheated or over-air-conditioned, but the damage was done, and the devices were removed.

Sensors that keep tabs on more than temperature are already all over offices—they’re just less conspicuous and don’t have names that suggest Bond villains.

“Most people, when they walk into buildings, don’t even notice them,” says Joe Costello, chief executive officer of Enlighted, whose sensors, he says, are collecting data at more than 350 companies, including 15 percent of the Fortune 500. They’re hidden in lights, ID badges, and elsewhere, tracking things such as conference room usage, employee whereabouts, and “latency”—how long someone goes without speaking to another co-worker.

Proponents claim the goal is efficiency: Some sensors generate heat maps that show how people move through an office, to help maximize space; others, such as OccupEye, tap into HVAC systems. The office-design company Gensler has 1,000 Enlighted sensors lining its new space in New York. Embedded in light fixtures, the dime-size devices detect motion, daylight, and energy usage; a back-end system adjusts lighting levels. The sensors also

learn employees’ behavior patterns. If workers in a given department start the day at 10 a.m., lights will stay dim until about that hour. So far, Gensler has seen a 25 percent savings in energy costs. It estimates the investment—installation cost the company about \$1.70 per square foot, or roughly \$200,000—will pay off in five years.

Legally speaking, U.S. businesses are within their rights to go full-on Eye of Sauron. “Employers can do any kind of monitoring they want in the workplace that doesn’t involve the bathroom,” says Lewis Maltby, president of the National Workrights Institute. And as long as the data is anonymized, as Enlighted’s is, some people don’t mind tracking if it makes work life easier. “It doesn’t bother me. It doesn’t feel intrusive,” says Luke Rondel, 31, a design strategist at Gensler. “It’s kind of cozy when you’re working late at night to be in a pod of light.” A majority of U.S. workers the Pew Research Center surveyed last year said they’d tolerate surveillance and data collection in the name of safety.

Up to a point, perhaps. The Boston Consulting Group has outfitted about 100 volunteer employees in its new Manhattan office with badges that embed a microphone and a location sensor. Made by Humanyze in Boston, the badges track physical and verbal interactions. BCG says it intends to use the data to see how office design affects employee communication. Outside critics have called the plan Orwellian and despotic—“It is a little bit invasive,” says Ross Love, 57, a BCG managing partner who volunteered—but the data collected is anonymized, and the company has pledged not to use it for performance evaluation.

Going even further, Enlighted is piloting a badge that lets a business track specific individuals via an accompanying app. CEO Costello says it’s more efficient to find a co-worker this way than it is to send a volley of e-mails and Slack messages and hope for a reply. The badges haven’t yet made it outside Enlighted’s offices, but there’s already interest from clients who want to use them to arrange in-person gatherings more easily, like a Facebook group come to life. “You get used to it,” Costello says. And if you don’t, try not to get too overheated about it and storm out of the building. You might just blast your colleagues with cold air. **E**



JOHN MANGIN

38, lawyer, Department of City Planning, New York

What's your job?
I run around mostly dealing with land-use policy issues.

How do you like to dress?
There's not a lot of bling in city government. Functionality and economy are key.

JCPENNEY

Where did you get that belt?
It's from an army surplus store I went to in Philadelphia. I like anything I can get in 15 colors, so I have this in brown, gray, black, and red. Maybe it's all the years of Catholic school that have given me a need to wear things I don't have to think about.

THOM BROWNE

UNIQLO

That's a nice coat.
It's probably the nicest article of clothing I own. My friend is a clotheshorse, and he'll dump stuff on me. I'm used to wearing things that fit like burlap sacks, so a piece with such a precise cut is so different. I sometimes feel like an impostor when I wear clothes this special, but once in a while it's fun to go out on the town in something good.

Did you inherit the shirt, too?
I did. It's the last of the shirts I took from my grandfather's closet in 2002. I got a huge cache of clothing when he died.

BANANA REPUBLIC

I. GOLDBERG

Are your shoes orthotics?
My college girlfriend's father gifted me a pair when he was done with them, and they're my favorite. I think you need a prescription for them. Even though I haven't dated her for 15 years, he still gets me the shoes.

Still?
Yeah! I love them so much. They're so comfortable and understatedly dorky that they fit my personality.

Your tie isn't a hand-me-down, right?
Right. When things don't come to me, I go to Uniqlo. It had all these knit ties on sale for \$2.99, and I bought everything.

SAS



JOY HOWARD

Chief marketing officer, Sonos

"I was an overachiever—class officer, cheerleader, drum major. It got complicated at halftime."



Seely, 1996

"Our band was called Seely. Being an artist is the hardest work on the planet. You spend 22½ hours a day doing stuff you don't want to do for that 1½ hours onstage."

Holding Elsa, her 1-year-old daughter, with a friend of Elsa's in tow, 2005



"The Converse brand has been built by musicians. Suddenly it was apparent that my experience in music was so much more important than I'd realized."

"My onboarding plan required that I free dive on the North Shore of Hawaii; snowboard in Hakuba [Japan]; fly-fish in the Tetons [in Wyoming]; snowshoe in Chamonix [France]; climb in the Gunks [in New York]; and go to the national park Patagonia helped create in Chile. I used every product the company made."



Rock climbing in Wheeler Gorge, Calif., 2015

Education

Southeast Bulloch High School, Brooklet, Ga., class of 1987

Agnes Scott College, Atlanta, class of 1991

University of North Carolina Kenan-Flagler Business School, Chapel Hill, class of 2002



As a class officer, 1986

"One day I thought, Man, I just want to make a decent living and leave the world a better place than I found it. And I could see people applying creativity to business to do exactly that."



"I worked on new product pipelines, specifically around teas. I traveled to tea plantations in Kenya, spent a lot of time in Eastern Europe and a lot of time in China, launching iced tea."



At the Sonos flagship store opening in New York, 2016

Work Experience

1991–92
Research analyst, Carter Center, Emory University, Atlanta

1992–93
Fellow, University of Cape Town, South Africa

1994–2000
Recording artist

2001–06
Analyst, product director, Johnson & Johnson

2006–10
Marketing director for functional beverages, global marketing director for beverage partners worldwide, Coca-Cola

2010–13
Vice president for marketing for Converse North America and Converse All Star, Nike

2013–15
VP for global marketing, Patagonia

2015–Present
CMO, Sonos

Life Lessons

YOU CAN'T BUILD THE BUSINESS OF TOMORROW ON THE NETWORK OF YESTERDAY.

It's no secret: business has changed—in every way, for every business. Modern technologies have brought new opportunities and new challenges, like BYOD and a mobile workforce, that old networks just weren't built for. While demand on these networks has increased exponentially, networking costs have skyrocketed and IT budgets haven't kept pace.

Comcast Business Enterprise Solutions is a new kind of network, built for a new kind of business. With \$4.5 billion invested in our national IP backbone and a suite of managed solutions, Comcast Business is committed to designing, building, implementing and managing a communications network customized to the needs of today's large, widely distributed enterprise.

COMCAST BUSINESS ENTERPRISE SOLUTIONS

COMCAST BUSINESS **B4B** BUILT FOR BUSINESS™

business.comcast.com/enterprise



AN MBA THAT'S AFFORDABLE, REPUTABLE, AND FLEXIBLE

MOVE YOUR CAREER FORWARD

When you decide to pursue your MBA, you don't want to wait to get started. With our self-paced Foundations of Business course, you can start right away on an MBA that is:

Affordable

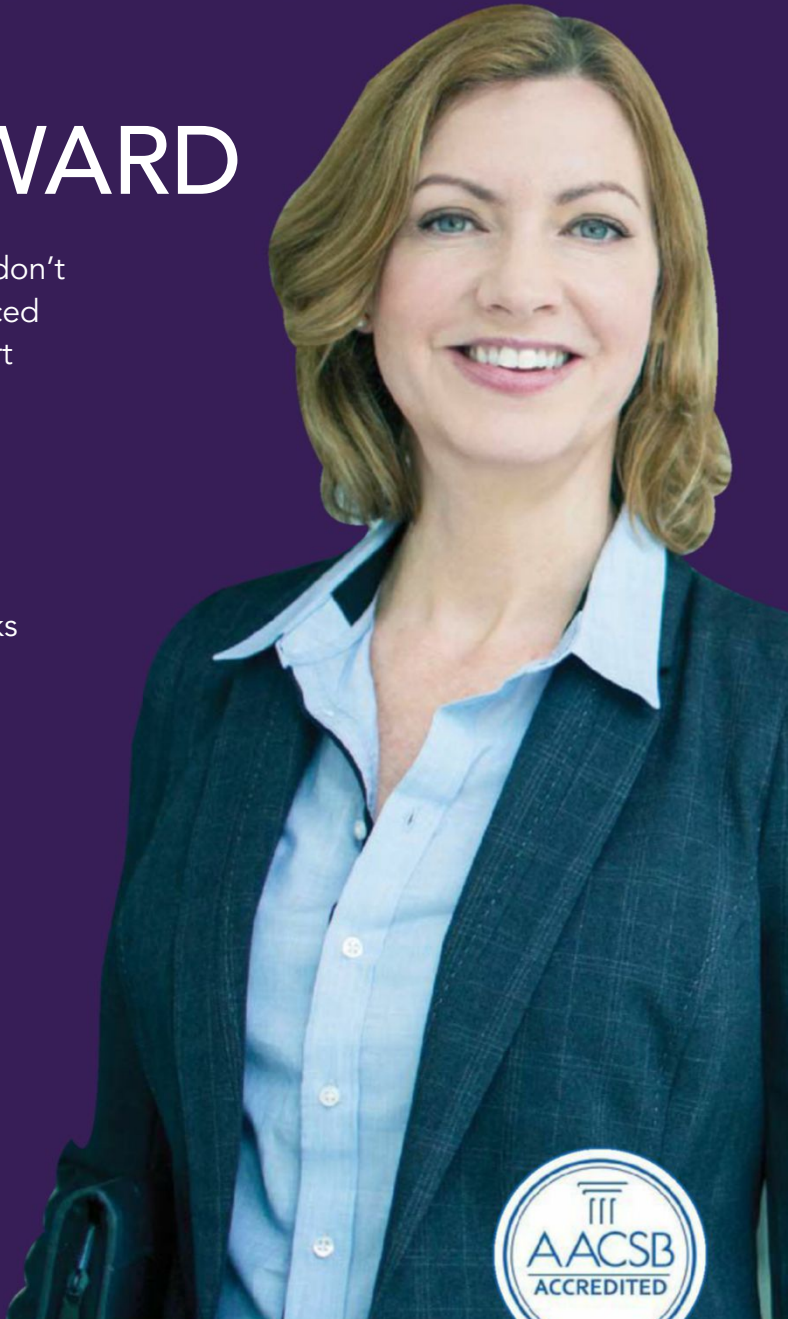
- At \$15,500, our MBA costs less than half the national average, offers an impressive return on investment, and consistently ranks among the nation's most affordable*

Reputable

- Our MBA program is accredited by AACSB International — a hallmark of excellence earned by fewer than 5% of the world's business programs — and ranked 17th in the world by CEO Magazine

Flexible

- Develop advanced skills by choosing from employer-valued concentrations, and learn online from anywhere or in our classrooms in Alabama, Beijing, Taipei, and Suzhou



GET STARTED TODAY AT [MBADEGREE.UNA.EDU/BW](https://mbadegree.una.edu/bw)

*MBA tuition national average is \$35,000–\$50,000, according to MBA.com (2016).